VETERINARY MEDICINE

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The Southern Issue

Internal Parasites of Cattle and Their Control

Fracture of the Penis in the Bull

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The Veterinarian's Responsibility in His Community's Public Health

Brucellosis Control and Eradication

Cervical Cultures in Mares

Antibiotics in Sterility

Cosmetic Ear Surgery

Infectious Canine Hepatitis

The Veterinarian and Civil Defense

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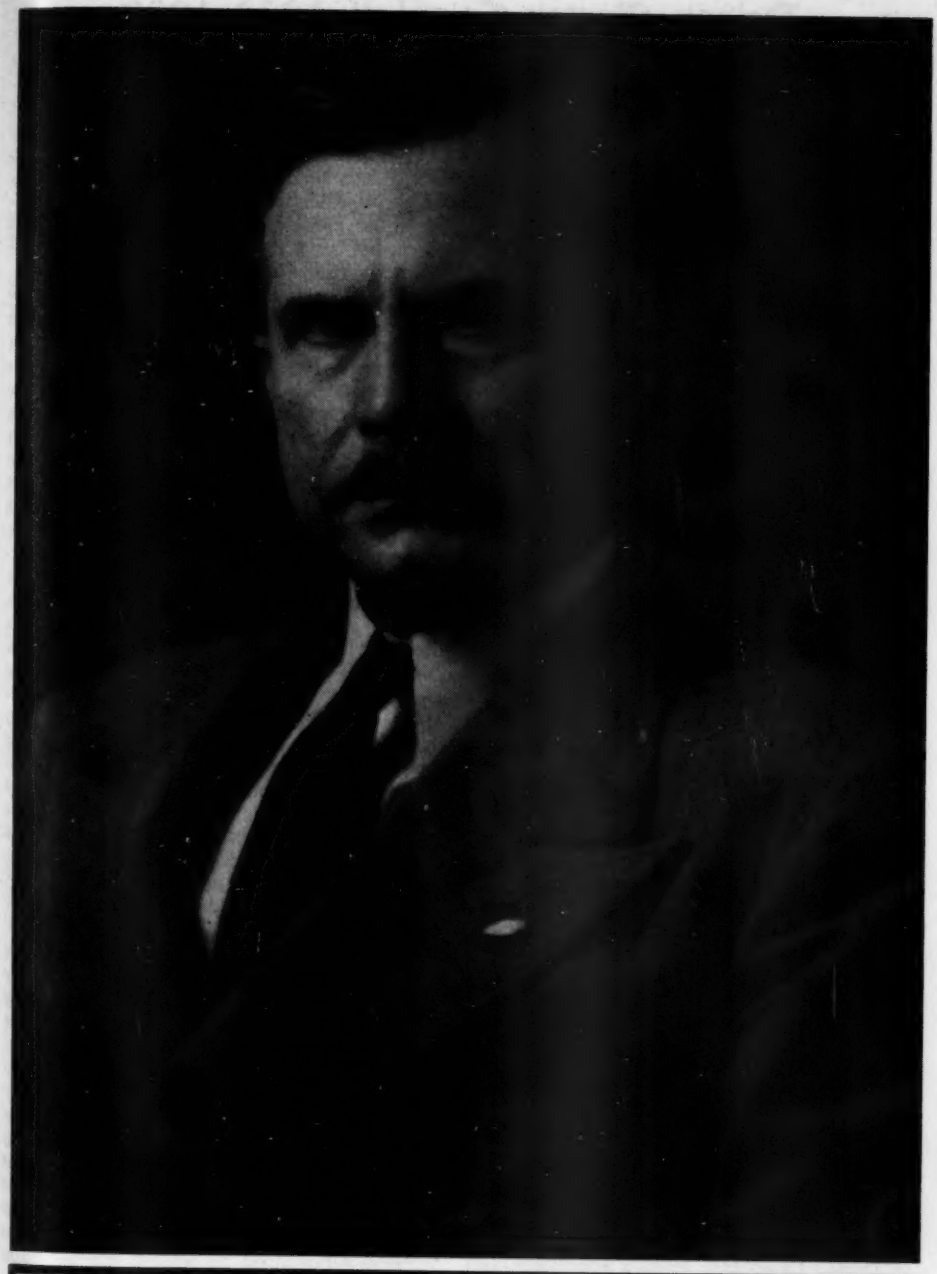

In Memoriam

DELWIN MORTON CAMPBELL — 1880-1952

Delwin Morton Campbell 1880-1952

The founder of this journal passed from this life at his home, 7632 South Crandon Avenue, Chicago, March 27, 1952, and was interred with honors befitting his rank in military circles at Arlington National Cemetery, April 1.

Doctor Campbell had been an earnest promotor of the Veterinary Officers' Reserve Corps and was assigned to active duty with the rank of colonel at the outbreak of World War II. It was, however, through steadfast pursuits in the role of editor and author that he earned distinction of being one of the foremost veterinarians of this period. His military career was a patriotic hobby, a minor sideline compared with his stature in the professional whirl of civil life. In veterinary history, "Dr. D. M. Campbell of Chicago" will be commemorated for having won worldwide prominence as a defender of wisely applied veterinary science and as a resentless critic of subversive trends in the educational, literary, and clinical fields wherever ill-advised or retroactive movements cropped up. Throughout his editorial, literary and business career, the medium he published stood out as a keen-sighted watchman possessing the knack of defining things in understandable satire that did more than met the eye toward keeping the application of veterinary medicine on the straight path of professional regularity. It would require a tome to tell the full story of what Doctor Campbell did to smooth out the rough and rugged road the veterinary profession had to travel during the years of his long editorial life. Suffice to say here that he was on the mound watching and pitching without a lapse all of the time and did a good job of keeping the morals of the game above reproach.

The present generation could easily classify this tribute with an exaggerated panegyric written to the memory of a departed friend. But that is far from all of the facts concerned. When, in 1910, he brought the *Missouri Valley Veterinary Bulletin* published at Hiawatha, Kan., to Chicago and renamed it the *American Journal of Veterinary Medicine* (changed to *Veterinary Medicine* in 1920) the total number of veterinarians who read current literature available was pitifully meager, obviously fewer than 3,000. Within ten years, the circulation of Doctor Campbell's venture was 9,000, and it was patronized liberally by all of the commercial houses producing technical supplies and all of the veterinary colleges open to student enrollment. Thus a completely new era of veterinary medicine was launched. In other words, Doctor Campbell furnished practitioners with needed reading material and taught them to read it, all of the while keeping independent of any influence within or outside of the profession. "Hew to the line and let the chips fall where they may" was the obvious motto that dominated his innermost ideas which, together with extensive travels and observations abroad, broadened them to the advantage of his literary undertakings.

Doctor Campbell was born at Big Springs, Kan., January 19, 1880. He received his preliminary education in the local schools and the Kansas State Agricultural College and was graduated by the Kansas City Veterinary College with the class of 1907. After a brief tour at practice in Oklahoma he returned to Kansas City to enter the faculty of his alma mater. In 1910, he moved to Evanston, Ill., where he participated in a going practice at 1021 Davis Street. Within a short time he was employed by the Abbott Laboratories, Chicago, for the ostensible purpose of developing in the veterinary profession the use of the newer alkaloids and glucosides—a pioneer project that sorely required the boosting of a publication such as the new *American Journal of Veterinary Medicine* recently imported from Kansas City under the name of *Missouri Valley Veterinary Bulletin*, (mentioned above) was well qualified to provide. It was to the credit of the editor and publisher that the journal rapidly outgrew the importance of its commercial alliance and not only became the life's work of its resourceful founder but also a monument in the field of the world's periodical veterinary literature, now publishing its 47th annual volume, and therefore too old to shed its abiding faith in the spirit of veterinary medicine.

There was nothing especially sensational in Doctor Campbell's work and ways. He just labored with calm dignity among his books and accumulated a fund of knowledge about veterinary medicine and the doings of its personnel that few have ever possessed.

Overtaken by age and failing health, he disposed of the financial responsibilities of the journal but, as his close friends would have expected, he held on to the last under the designation of consulting editor.

With the passing of Doctor Campbell, the profession has lost one of its sturdy leaders.

He is survived by his widow, nee Gertrude E. Hole of Manhattan, Kan.; a son, D. M. Campbell, Jr., chemical engineer of St. Louis, Mo.; and two charming daughters: Mrs. Dorothea Sides of Biloxi, Miss., and Mrs. Eloise Selvidge of Birmingham, Mich. — *L. A. Merillat.*

The Southern Issue

IN this, the Southern Issue, most of the literary program presented at the 34th annual convention of the Southern Veterinary Medical Association is presented.

On this occasion, there assembled at Lord Baltimore Hotel, Baltimore, Md., on October

Dr. A. A. Husman

22-24, 1951, the largest number of practitioners ever to attend a meeting of this active association.

The first meeting of what was then known as the Southeastern States Veterinary Medical Association was held at Atlanta, Ga., in 1916. The name was changed to the Southern States Veterinary Medical Association in 1931, and to its present designation in 1939.

Throughout its history, primary objectives have been directed toward strengthening clinical veterinary medicine in the South. Problems peculiar to the region have been and continue to be featured in deliberations at annual conventions. These activities have provided leadership and increased confidence of livestock growers that the South has advantages existent nowhere else in the United States for profitable production of meat and animal products. Expansion of livestock enterprises in many states of the southern section bears witness to the soundness and farsighted vision of veterinary leaders.

Interest manifested in the literary program rewarded those responsible for assembling it. To say that it was exceptionally good is an understatement of facts. All sessions were well attended. Facilities of the hotel were ample for all features, including display facilities for commercial firms which were well represented, as well as for social events.

Dr. F. M. Kearns

Maryland night long will be remembered by those in attendance. This began with an excellent meal and ended with singing and dancing.

Dr. John D. Gadd

At this meeting, Dr. F. M. Kearns, Louisville, Ky., was elected president, and Dr. John D. Gadd, Cockeysville, Md., president-elect. The congenial and hardworking secretary, Dr. A. A. Husman, Raleigh, N. Car., was re-elected to this important post.

Jacksonville, Miss., was selected as the meeting place of the 1952 convention. Time and place will be announced later.

Internal Parasites Of Cattle And Their Control*

LEONARD E. SWANSON,† B.S., D.V.M., and EDWARD G. BATTE,††
B.S., D.V.M., M.S., Gainesville, Florida

THE southeastern United States is rapidly becoming a major livestock producing area. Year-round grazing, cheaper land, abundance of rainfall, sunshine, mild climate, and large unimproved areas suitable for grazing have attracted growers from northern and western regions. Road networks for trucks and railroads, together with the establishment of many larger packing plants for processing and distributing the edible products, are other factors for potential profitable livestock operations.

Many old cotton plantations, flatwoods, and sandy or clay hills have been converted into productive pastures. Bulldozers and other modern farm improvement equipment have converted thousands of acres of marginal lands into improved seeded grazing land.

With the advent of increased livestock population, the incidence of disease, especially that caused by parasites, increases. Cattle grazing on virgin soil, open ranges, or highly cultivated fields with access to extensive areas are seldom heavily infected; at least the problem is of minor importance. Rotation of pastures and grazing of high growing vegetation reduces incidence.

In Florida, the parasite burden is kept at a minimum by separating age groups of animals and providing cross-fencing of pastures of 75 to 100 acres each; then moving the cattle periodically. Improved pastures, with continual grazing or congregation of large numbers on a given area, mean more parasite ova per acre, and consequently an increased parasite load per animal. The high price of cattle has stimulated livestock production and in many cases far in excess of available improved pastures. Result has been overstocking and overgrazing.

Modern sales yards, transportation facilities, railroads, automobiles, trucks, ships, and even airplanes have played their part in spreading parasitic diseases from one ranch, county, state, or country to another.

Parasitic Loads May Become Extreme

Internal parasites which infect cattle in this area are many, and the problem is always aggravated by mixed infection. To give a complete picture of the problem, it is necessary to list the parasites usually encountered, and in many instances, all of these are found in one animal. An infected six-month-old calf from one herd under observation, which was autopsied at our laboratory, indicated severe infection. Count of adult parasites is given in the following table.

Number	Parasite	Where Found
200	*Haemonchus contortus*	Stomach
8,600	*Ostertagia ostertagi*	"
2,400	*Trichostrongylus axei*	"
10,400	*Strongyloides spp.*	Small intestines
53,900	*Cooperia spp.*	" "
100	*Bunostomum phlebotomum*	" "
787	*Oesophagostomum radiatum*	Large intestines
61	*Trichuris discolor*	" "
5,389	*Dictyocaulus viviparus*	Bronchi of lungs

Many other calves and adults in this same herd were infected with liver flukes, *Fasciola hepatica*; ascarids, *Ascaris vetulorum*; and tapeworms, *Moniezia spp.*, as well as several species of Coccidia. In another herd, 1,025 adult and immature liver flukes, *F. hepatica* and *F. aegyptica*, were counted in a ten-month-old calf. It is often said that adult animals are resistant to parasite loads; however, one eight-year-old cow had, on necropsy, 26,160 *O. ostertagi* and 20,160 *T. axei* in the abomasum. The intestinal tract was not checked and could have been heavily parasitized, as the cow was emaciated.

Many ranchers feel that good feed will prevent death losses from parasite infections. The writers concur in the theory to the extent that they believe well fed animals are more able to withstand infections by virtue of being prop-

*Presented at the 34th annual convention of the Southern Veterinary Medical Association, Baltimore, Md., Oct. 22-24, 1951.

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erly nourished. One rancher had cattle belly-deep in red clover, Bermuda grass, etc., and they began dying. There were too many animals permanently grazing over a given area. On necropsy of four ten-month-old calves, an average of 4,711 *H. contortus*, 10,725 *O. ostertagi*, and 30,697 *T. axei* in the stomach, and 2,466 Cooperia, as well as a light hookworm infection, were found in the intestines.

Another case report which is worthy of mention here was the necropsy of a 19-month-old Jersey steer raised in a dairy paddock. This animal exhibited tremendous infection. On necropsy, 387 lungworms, *D. viviparus*, were identified in the bronchi; 13,300 wireworms, *H. contortus*, 14,200 *O. ostertagi*, and 10,800 *T. axei* in the true stomach; 5,600 nodular worm lesions, *O. radiatum*, 868 hookworms, *B. phlebotomum*, 7,600 Strongyloides and 10,200 Cooperia in the small intestines; and 1,237 nodular worms, *O. radiatum*, in the large intestines.

Symptoms of Parasitism

Symptoms of parasitism in cattle are difficult to describe, as there is a very close correlation with feeds and nutritional deficiencies. Furthermore, as one can realize from necropsy reports cited, mixed infections are the rule. Symptoms of mixed parasitism in cattle are severe emaciation, anemia, as manifested by pallor of the visible mucous membranes, weakness, dejected appearance, rough haircoat, "pot-belly" in younger calves, and diarrhea which may be fetid, occasionally blood-stained, and covered with mucus. Diphtheritic enteritis is common, especially with Strongyloides infection. Again, one may find the animal constipated. In some instances, and especially where liver flukes, stomach or hookworms are involved, "bottle jaw" or edematous swelling under the jaw is commonly observed. Bloody or dark fetid feces usually indicate the presence of hookworm infections. Strongyloides produce marked weakness; in extreme cases infected animals will show toxic symptoms and die in convulsions. Tapeworms do not appear to cause much pathology except to weaken the animal. Cattle infected with liver flukes die from hepatitis and calcification of the bile ducts, with an apparent toxemia. In lungworm infection, an infected calf coughs when moved or excited, a cream-like discharge exudes from the nostrils and the calf continually licks its nose. Such an animal will extend its head, protrude its tongue and move with a great deal of effort. A jugular pulse is prominent, and death occurs from suffocation.

Diagnosis

Parasitism is diagnosed in the living animal by observing typical symptoms and by microscopic examination of the feces for parasite ova. Take samples (50 to 100 gm.) direct from the animal, place in a clean jar or container, and chill overnight. Do not take fecal specimens from the ground or litter, as they are contaminated and will confuse findings. Fecal samples should not be taken following the administration of laxatives, since the latter may reduce concentration of ova. Ova of various parasites can be differentiated readily and a definite diagnosis is possible. A negative fecal finding does not always mean that the animal is not infected, but that the sample was free of ova. All specimens do not carry ova, even in infected calves; however, repeated negative tests are reliable.

Lungworm infection is diagnosed by the use of a Baerman apparatus, finding the larvae in the feces. Samples four or more days' old are unreliable for lungworm tests, as other parasitic larvae will be present which may be difficult to differentiate.

Tapeworm infection is diagnosed by finding segments in the feces. Seldom are ova found in a flotation or sediment test.

The best and most accurate method of parasite examination is by flotation test, using sodium nitrate saturated solution having a specific gravity of 1:300 to 1:400. Stir the fecal sample, weigh out 10 gm., place in Erlenmeyer flask, add 300 cc. of water, agitate until all feces are in suspension, pour off 10 cc. into a centrifuge tube, and centrifuge for five minutes. Pour off all supernatant fluid, add saturated sodium nitrate, stir and bring solution to the top of the jar sufficient to form a meniscus, and place a cover slip or slide over the top. In five to 15 minutes, examine under low power, and for every ovum observed multiply by three, which will roughly equal ova per gram of feces. Fluke ova cannot be lifted in these heavy solutions as they are ruptured, distorted and lose their identity. Sedimentation and siphoning of feces from fluky cattle is tedious but reliable, even in light infections.

The most accurate diagnosis is made by necropsy of a sick animal. The calf is destroyed, preferably by shooting, and bled out completely. The carcass is opened by splitting the hide down the median line, taking off both shoulders, breaking the hind legs at the acetabulum, and cutting through the ribs, thus exposing all internal organs. The abomasum is tied off at the pyloric and cardiac ends,

the small intestine at the stomach and ileocecal ends, and the large intestine at the cecal and rectal ends. This procedure prevents adult parasites from draining from one location to another and makes for an easy and accurate diagnosis.

Remove all organs, making careful note of findings. On a field post mortem, each organ can be split open and examined for macroscopic parasites. If the stomach and intestines are opened and placed in the sun with small amounts of water, one can see the parasites moving around in the fluid. Evidence of microscopic parasites will be observed as flabby edematous swelling in the stomach and thickening of exudates having a reddish color in the small intestine.

Complete diagnosis of microscopic parasites can be made only by the use of screening and dissection microscope in the laboratory. Lungs, liver and other organs are carefully split open and examined for parasites. For herd diagnosis, it is advisable to follow cattle to the slaughter-house and make periodic parasite checks, especially of the liver, lungs and stomach.

The life history of the various parasites is not complicated and does not warrant discussion here. In general, flukes, tapeworms and filaria require intermediate hosts such as snails, grass mites and bloodsucking insects; whereas other parasites infect the host directly, usually in the larval stages, and are found on vegetation, in contaminated litter and drinking water.

Management Practices for Parasite Control

Control of parasites must be carried out on pastures, yards, and other areas frequented by animals. General farm sanitation is necessary. Clean drinking water should be provided and old ponds, swamps, sloughs and mudholes fenced out. Paddocks and corrals should be well drained and cleaned frequently. Avoid draining barn washings through calf pens, yards or pastures.

Avoid overstocking of pastures, move cattle frequently, and do not allow them to graze grasses close to the ground. Pasture should be cross-fenced into small areas and the animals moved when the vegetation becomes short. Segregate ages of animals. Do not mix all ages. Six-month rotation of pastures will materially cut down parasite infections, and one year non-grazing will practically eliminate larvae. Rotation of pastures with horses, mules or swine will aid in eliminating bovine parasites.

Young cattle should not graze with older animals. Cultivated fields or new plantings with well drained fields are ideal. Paddocks should be bare of vegetation, and shade should be provided by means of a portable shelter. Never feed animals off the ground; provide feed racks and feed troughs.

Burning of pastures is not recommended; however, this method will destroy many larvae. Again, utilize tall-growing grasses and practice rotation of age groups and pastures. Avoid mucky, wet lands, deep shade ponds, etc., to prevent lungworms. Destroy liver fluke areas by drainage (V-type ditches), and apply copper sulfate to destroy the snails which serve as the intermediate hosts for flukes.

Dairy herd replacement cows create a serious problem in the South. Prior to 1946, dairymen refused even to try to raise heifer calves from their herds. They felt that it was impossible to raise good animals and purchased all of their replacements from the North, and usually at high prices. Since that time, however, a workable plan has been set up whereby they are, for the most part, raising their heifer replacements. The newborn calf must have its mother's colostrum for at least the first three days. If nursing cows are used, it is best to keep the calves in small pens, concrete floored, with small amounts of bedding; sawdust or wood shavings preferred. This should be cleaned out daily. The cow should be allowed to enter the pen only to nurse its calves. If bucket fed, it is best to utilize suck-buckets. Where concrete pens are impractical, portable pens with a shelter may be used, moving them up the hill at weekly intervals. As the calves develop and are ready for pasture, they should be moved in age groups to clean, well drained improved pastures, and fed supplementary feeds (concentrates) and minerals free choice. Periodic fecal examination for parasites should be made. Marginal lands, such as hillsides, oak or other forest lands or virgin lands make ideal areas to start calves.

Treatment

Many parasites infecting cattle cannot be removed successfully by drugs or chemicals. Lungworms, Cooperia, Strongyloides, intestinal threadworms, tapeworms, ascarids and even hookworms are persistant parasites, defying all means to remove them from their respective locations in the host. Adult liver flukes are removed from bile ducts of cattle

(Continued on page 176)

Fracture Of The Penis In The Bull *

JAMES FARQUHARSON,† D.V.M., Fort Collins, Colorado

THERE is a dearth of material in veterinary literature regarding fracture of the penis. It is commonly mistaken for prolapse of the prepuce. Other diagnoses such as hematoma have been made, and in delayed cases, abscesses may be observed so that the original fracture is overlooked. The condition is undoubtedly more common than has been reported. The term "fracture" might be objectionable and "broken" could be substituted. Other terms employed to designate the injury include hematoma and rupture. The unqualified term fracture denotes a break of the tunica albuginea with an escape of blood into the surrounding tissues. With an accurate history and proper physical examination, diagnosis is not complicated.

The penis of the bull has a dense, heavy covering, the tunica albuginea. Elongation of the penis, in the act of erection, takes place by relaxation of the retractor penis muscle and the concomitant effacing of the sigmoid flexure. Therefore, very little actual lengthening or increase in size takes place in erection.

Injury occurs at the time of coitus. It is most likely to occur when a heifer, or small cow, goes down under the impact of the weight of the bull, although there may be other causes.

Symptoms

Immediate symptoms are lacking except for a slight shortening of stride, slightly arched back, and possibly stiffness in the character of the gait as far as the hind legs are concerned. Many animals exhibit a prolapse of the prepuce within a few hours. Observant owners may notice a large and extensive swelling in the prescrotal region. The swelling at first is soft and resilient; later it becomes hard and doughy and pits on pressure with little or no increase in heat. The nonpigmented skin is mottled. If prolapse of the prepuce is present, it may become edematous and soiled with foreign matter. Urination is normal.

Systemic symptoms are lacking, such as elevation of temperature, inappetence, shock, or general malaise of the animal.

Fracture is almost invariably on the dorsum of the penis and only the corpus cavernosum penis is involved. The corpus cavernosum urethra escapes injury. Fracture is usually just anterior to the terminal curve of the sigmoid flexure and opposite the attachment of the retractor penis muscle. The break in the tunica albuginea varies from 2.5 cm. to 7.5 cm. in length and may be spiral, oblique, or roughly longitudinal. The amount of parapenal hemorrhage is limited only by the superimposed tissue, the deep fascia, and the skin. The amount of blood that escapes will vary from 1 to 3 liters. Clotting takes place some hours after the injury. The size of the hematoma produces pressure anteriorly and frequently causes prolapse of the prepuce. Intelligent surgical intervention is delayed preferably until the third or fourth day after injury, for the purpose of allowing the formation of a solid blood clot which facilitates surgery. If performed early after the incidence of injury, free flow of blood increases the difficulty of the operation.

Prescrotal hemorrhage with accompanying swelling are suggestive symptoms of rupture of the tunica albuginea — fracture of the penis in bulls. Prolapse of the prepuce may also be observed, as illustrated above.

Treatment

Preoperative measures consist of a 24 to 30 hour fast. The field should be shaved. Anesthesia of choice is general or spinal. Epidural

*Presented at the 34th annual convention of the Southern Veterinary Medical Association, Baltimore, Md., Oct. 22-24, 1951.

†Department of Surgery and Medicine, Colorado A. & M. College, Fort Collins.

anesthesia fails to desensitize completely the operative field.

The operative area should be thoroughly protected with sterile drapes and aseptic procedures followed to accomplish the objective of primary union.

An incision, 15 to 20 cm. long, is made over the swelling and parallel to the course of the penis. Skin and subcutaneous tissue are quite vascular and all bleeding must be controlled by ligation or compression. Incision is carried into the blood clot which protects the body of the penis. Clotted blood is meticulously and completely removed, and the penis then brought through the incision. All fibrin is carefully removed from the penis until its normal structure is revealed. The break in the tunica albuginea is thoroughly exposed and shreds are carefully excised; care being taken not to sacrifice healthy tissue.

All coagulated blood in the corpus cavernosum penis is expressed or removed and the rent is sutured with interrupted chromic catgut sutures, no. 2 preferred. Any fibrin or blood clots remaining are severed and removed. Complete control of hemorrhage is essential, and if oozing persists, some reliable coagulant such as gelfoam® should be used. Superimposed subcutaneous tissue and skin are sutured and suitable protective dressing applied. Collodion is recommended in this instance.

Success of surgical repair depends upon asepsis, operating before organization of the clot, removal of blood clots, careful approximation of the edges of the torn tunica albuginea, and hemostasis.

Rest is imperative following most operations; however, success depends upon keeping the animal sexually stimulated by quartering adjacent to a cow or heifer in estrum. Adhesions otherwise will develop between the penis and the overlying incision. Coitus has been successfully performed within a week following surgery.

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Doctor Carr to Retire

Dr. A. K. Carr, chief of the Division of Animal Industry, California Department of Agriculture, requested retirement effective March 17. Doctor Carr has served the California livestock industry for 23 years. It has been announced that he will reside in Los Angeles.

Director A. A. Brock appointed Dr. Arthur G. Boyd, McK '18, assistant chief, to succeed Doctor Carr.

®The Upjohn Co., Kalamazoo, Mich.

Internal Parasites of Cattle

(*Continued from page 174*)

by administering hexachlorethane, 10 gm. per 100 lb. live weight. This drug will not remove the immature flukes; consequently a repeated dose is essential in 21 days. Death losses due to fascioliasis have been stopped by the use of this chemical. This treatment does not remove the scar tissue caused by flukes, and the liver will be condemned upon slaughter. Owners should be cautioned accordingly. Liver flukes cannot be controlled by removal of the parasite alone. Treatment should be combined with a program to destroy the intermediate host.

Experiments at the Florida Agricultural Experiment Station have shown phenothiazine to be the most effective drug for removing gastrointestinal parasites of cattle. This chemical is not a panacea; however, properly administered it will remove all stomach worms and nodular worms and a few of the other pathogenic parasites, such as Cooperia and hookworms. Procedure recommended in Florida includes fasting animals overnight, allowing free access to fresh water before treatment. No adverse reactions to the chemical have been observed. It is eliminated promptly. Phenothiazine is most effective administered on a basis of 10 gm. per 100 lb. live weight, with a maximum dosage of 70 gm. for strong adults such as bulls and cows. A minimum dose of 10 gm. should be given to small, weak dairy calves. The best product on the market for treating wormy cattle is the large bolus containing this drug combined with the sulfates of copper, cobalt and iron.

In Florida, death losses in cattle from mixed infections, including lungworms, have been stopped by the administration of phenothiazine according to the above schedule. The second treatment is always given on the 21st day. Then, too, the animals are removed from the infected pastures, and if lungworms are severe, the calves are fed hay, grains and minerals free choice. Carbon tetrachloride, tetrachloroethylene, copper sulfate and nicotine, kamala, bisphenols, toluene, and many other agents have given poor or negative results. The general program for ranchers and dairymen is to worm their calves and yearlings at least once in the fall and again in the spring. When heavy parasite infections are determined, growers are advised to worm the entire herd in the fall and repeat the dosage on calves and yearlings in 21 days.

Teat Surgery*

ROY D. HOFFMAN, V.M.D., Bedford, Pennsylvania

INCREASED milk production in this country has been accomplished largely by influencing the agriculturist to pay more attention to the blood lines of his cattle. The milk producing cow has changed more radically than has the farmer who owns it. A well bred cow is an entirely different animal from the "Bossy" today's dairyman knew as a boy or the "brindle" his daddy owned.

The modern dairy animal requires and is worth careful watching. Many of the troubles we are called upon to treat, particularly those that affect the teats, are due to neglect on the part of owners.

The gigantic business of producing milk and milk products is wholly dependent upon healthy udder function of many animals. Billions of dollars of the world's wealth is funneled through the openings in teats which are never as large as a soda straw.

Basically, teat surgery is successful in restoring production or saving the usefulness of a valuable animal in direct ratio to the care the veterinary surgeon uses in applying constantly improving modern technics.

The following group of conditions will be considered: mashed teats, lacerations, infected sphincters, fistulas, tumors, cordy teats, supernumerary teats and leaking.

Mashed Teats

Too small or too short a stall results in a high incidence of mashed teats. Some cows make a habit of standing in the stall of either neighbor. This can be stopped by placing a 2" x 6" plank or a small object to serve as a partition. Cows will move away from such obstruction and remain in the space allotted. Injuries are inflicted when the cow attempts to get up. This often occurs immediately following freshening, and is observed most frequently on pendulous udders.

During examination of a mashed teat, the mucous membrane invariably will be noted to have a necrotic or dark area. Circulation to the part has been obstructed and tissue has become necrotic. Unless removed immediately, such areas promote bacterial growth.

Treatment

After thoroughly cleansing and applying nonirritating antiseptics, insert a previously sterilized Hugg's tumor extractor through the opening of teat; then remove with a quick pull. Do not attempt to close forceps. The instrument acts as a curette. When teats have small opening, use a Stoll's bistoury. Insert, give a quarter turn, and remove. Then follow with Hugg's forceps to remove all rough edges.

Dilators, similar or identical to professional type are inserted after injecting 500,000 to 1,000,000 units of penicillin and 1 gm. of streptomycin suspended in oil. One may also inject 25 cc. of triple sulfonamide solution composed of sulfamethazine 4%, sulfamerazine 4%, sulfathiazole 4%, or 25 cc. of sulfamethazine solution. Cover teat with cohesive bandage daily and continue use of dilators for three to five days or until swelling is relieved. Instruct owner to insert 300,000 units of penicillin with 225 mg. of streptomycin in ointment base each evening until all swelling has disappeared. Terramycin ointment may be used for follow-up treatment.

Minimum Requirement for Preparation of the Teat

1. Clean udder and teat area thoroughly.
2. Boil or autoclave all instruments.
3. Saturate a thin pledget of cotton with a good antiseptic of choice and apply to end of teat. Leave intact for a minimum of five minutes.
4. Remove all dead tissue and sufficient healthy tissue so that, with moderate pressure applied, the stream of milk is as large as a wheat straw.
5. Inject 500,000 to 1,000,000 units of penicillin and 25 to 30 cc. triple sulfonamide or sulfamethazine solution. Insert professional type dilator and apply ointment to end of teat.

Teat Bandages (Demonstrated)

A bandage which adheres only to itself and is known as cohesive* is recommended.

*Presented (with motion pictures) at the 34th annual meeting of the Southern Veterinary Medical Association, Baltimore, Md., Oct. 22-24, 1951.

*Manufactured by Johnson & Johnson, New Brunswick, N. J.; Brasel Products, Inc., Batavia, Ill.; General Bandages, Inc., Chicago, Ill.

This material will stick to itself but will not adhere to the skin. It is oil and water resistant. Air will pass through pores. Start bandage at bottom of teat with overlap of 1 in. Wrap in upward direction to base of udder. Place 4 in. doubled strip over end and extend over each side. Form the bandage by light hand pressure. Bandage will conform to teat contour. Place one section of ½ in. adhesive so that part is on bandage and part on base of teat. Remove and re-apply each time cow is milked, with proper precautions stressed. Continue with dilators until swelling has disappeared or for a minimum of three days.

Keep cow in a clean box stall. Continue daily dressings until teat is completely healed.

Cuts and Lacerations

A nonirritating, soapy disinfectant is used to cleanse cut area completely. Sulfathiazole or wound powder is dusted over wound. Suture. Dust sutured wound. Cover with flexible collodion. Recommended wound (pink eye) powder:

Tyrothricin	.05%
Sulfathiazole	20.00%
Sulfanilamide	78.05%
Methylrosaniline chloride	.90%
Phenacaine hydrochloride	.100%

The patient should be kept in a clean box stall and supplied only a maintenance ration for two weeks. Milk with sutured area in palm, applying pressure at base of udder with thumb and index finger.

Some clinicians suggest that a teat tube with cap be inserted into the milk cistern; sutured to the skin. From personal observation for 20 years, the writer has never seen one cow free of mastitis after any type of metal tube was employed.

Infected Sphincter

Frequently, a farmer will direct attention to a cow that "seems to milk hard today." The stream is slightly smaller and has a tendency to spray. If this teat has not been injured, it is probably due to an infected sphincter. This can become quite serious. It, however, is quite simple to treat if the owner is observant. Apply a 10% silver nitrate solution daily for two or three treatments. As soon as the solution is dry, apply acriflavine ointment. Prompt recoveries are the rule. Recommended formula:

Acriflavine, N.F.	312 mg.
Urea, U.S.P.	1.14 gm.
Sulfathiazole	1.41 gm.
White petrolatum base	q.s. 2 oz.

Teat Fistula

Openings the size of a pencil lead can be closed when cows are dry by painting the opening and surrounding orifice with butter of antimony. Instruct the owner to paint orifice every other day until a scab forms, being careful to use small swab that does not drip. The small end of a toothpick is used as a swab holder. This treatment should be applied only if it is expected that the cow will not show evidence of springing for at least three weeks.

Tumors (Spiders)

Wart vaccine is recommended. Inject 50 cc. every other day. If tumors are not severe, such treatment can be expected to be followed by good results.

Cordy Teats

This condition arises most frequently as a result of group housing and feeding of calves. Mild milk flow is encouraged, but is not removed regularly and an inflammation follows with resulting occlusion. It can also follow mastitis. Surgical relief and the use of antibiotics as referred to earlier, must be employed. Better calf management prevents this condition in heifers.

Supernumerary Teats

Remove when calves are four to six months of age. Burdizzo forceps or Ferguson's spaying shears serve as satisfactory instruments.

Leaking Teats

By means of a tuberculin syringe, inject 2 or 3 gtt. of Lugol's solution or a solution of resublimated iodine in oil of sweet almond, for its blistering effect. This should be deposited just beneath the skin around the orifice that is leaking. These injections should be made at two to four different sites, according to degree of constricting effect desired.

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All 48 states appropriated funds with which to combat brucellosis, but 20 states did not make indemnity payments for reactors slaughtered. Federal indemnity is contingent upon an equal or greater payment by the state. There were 111,904 reactors slaughtered during the fiscal year. Indemnities, however, were paid on only approximately 25,000 of these.—*Annual Rept., Chief, BAI, 1951.*

Research On Brucellosis Of Animals*

C. A. MANTHEI,† D.V.M., Beltsville, Maryland

ALTHOUGH it has been known for a considerable time that swine are susceptible to the three species of Brucella, recent findings by McCollough, Eisle, and Pavelchek indicate that *Brucella abortus* and *Br. melitensis* infections in swine are more prevalent in this country than previously suspected. These investigators obtained mandibular lymph glands from 5,000 hogs slaughtered in a large packing plant in the Middle West. Brucella was isolated from 35 of these, or 0.7%. Of these recoveries, 31.4% were *Br. melitensis*, 28.6% were *Br. abortus*, and 40% were *Br. suis*. The source of exposure to the various species of Brucella is unknown.

Br. melitensis and *Br. suis* have been isolated from the milk of cows in this country. Pregnant cattle have been infected by being placed in contact with goats infected with *Br. melitensis*. Such cattle were not infected when placed in contact with swine infected with *Br. suis*. However, a lead on a possible means by which cattle may become infected with *Br. suis* has been reported by Washko, Hutchings, and Donham. They have been successful in producing udder infection in cattle by swabbing the teat orifice with a suspension of viable virulent *Br. suis* organism.

In this country, *Br. abortus* and *Br. suis* have been isolated from horses affected with poll evil and fistula of the withers. It has been impossible to demonstrate the transmission of *Br. abortus* infection from infected horses to susceptible cattle by contact but circumstantial evidence indicates brucellosis may be spread in this manner.

Br. abortus has been isolated from milk of a ewe by Stoenner, in this country. This is the only proved case of naturally occurring *Br. abortus* infection in sheep in the United States although *Br. abortus* and *Br. melitensis* infections are not uncommon in sheep in Europe and Asia. The Beltsville station was unsuccessful in its attempt to transmit either *Br. melitensis* from infected goats to sheep or *Br. abortus* infection from infected cows to sheep by natural contact. However, sheep can be infected with both *Br. melitensis* and *Br. abortus* by conjunctival exposure.

In general, the three Brucella species usually produce a more self-limiting disease in a foreign host than in the natural host. However, the fact that many species of domesticated animals are susceptible in varying degrees to all three species presents a serious problem in the control of brucellosis. For example, it is not inconceivable that swine infected with *Br. abortus* may be carriers responsible for spreading the infection to cattle when they are allowed to cohabitate. This raises the question: *Can brucellosis be eradicated from one species of animals without giving consideration to the disease in other species?*

Role of the Bull in Transmission of Bovine Brucellosis

There is no conclusive evidence that a bull disseminating virulent *Br. abortus* in the semen is capable of transmitting infection to susceptible cattle by natural service. The greatest danger in this method of breeding is contamination of premises with semen, urine, and feces. In swine, the condition is somewhat different. Brucellosis is readily transmitted from the boar to sows by natural service.

Brucellosis can be transmitted to susceptible cattle by intrauterine insemination with semen containing virulent *Br. abortus*. Under carefully controlled conditions, infection was produced in eight of 12 cattle by this method.

The intracervical method of insemination failed to produce infection in 12 susceptible cattle.

The location in which semen contaminated with *Br. abortus* is deposited in the genital tract of a cow apparently influences the rate of conception, as well as the rate of infection. Only one of 12 cattle conceived to the first insemination by the intrauterine method as compared with nine of 12 by the intracervical method and six of six by natural service. The same infected bull was used throughout the experiment.

These findings emphasize that only disease-free bulls should be used for supplying semen for artificial insemination of cattle.

*Presented at the 34th annual convention of the Southern Veterinary Medical Association, Baltimore, Md., Oct. 22-24, 1951.

†Animal Disease Station, Pathological Division, Bureau of Animal Industry, Beltsville, Md.

Vaccines and Vaccination

Vaccination, like any other method of brucellosis control, is approved by some persons and opposed by others. The writer believes that vaccination has a place in the bovine brucellosis control program if its limitations are fully realized and it is intelligently applied.

A living vaccine produced from *Br. abortus* strain 19 is the only official vaccine in this country at present. Strain 19 is one of reduced virulence and is *not avirulent* as some persons have stated. It produces a mild infection and is capable of causing an occasional abortion when injected into pregnant cattle. However, all experimental evidence indicates that the infection produced by strain 19 is temporary and has never been transmitted to susceptible animals by contact. The immunity produced in cattle with strain 19 is usually relative and seldom absolute. This is clearly demonstrated by exposing vaccinated animals to varying amounts of virulent *Br. abortus* organisms. Therefore, the efficiency of strain 19 vaccine in controlling brucellosis in cattle depends on good herd management and sanitation.

The question, what is the duration of immunity induced in cattle with strain 19, has received many answers, some of which are based on facts and many on opinions. Birch, Gilman, and Stone have reported that immunity induced with strain 19 was least in the fourth pregnancy, whereas Buddle from New Zealand could not detect any difference in immunity in vaccinated cattle during the various pregnancies. In what was believed to be a carefully controlled experiment, no evidence was found that immunity decreased with an increase in age of the animal. As a matter of fact, the six and seven-year-old animals exhibited more resistance to virulent *Br. abortus* than did the two-year-olds.

Another question that is frequently asked is, what is the desirability or necessity of revaccinating cattle? Until revaccination is proved necessary and has merit, it should not be recommended.

Merits of the various methods of vaccination have been a controversial issue for some time. A careful review of the available information on the subject shows no evidence that one method is superior to the others. If there are advantages in any one method, they are related to the ease of operation under specific conditions.

Several new approaches to vaccines and vaccination against brucellosis in cattle have been reported. A vaccine produced by Huddleson from mucoid forms of *Br. suis* has been used experimentally for vaccinating cattle against brucellosis. Bacterins prepared by Live from ether-killed virulent *Br. abortus* suspended in excipients have showed some promise, at least in guinea pigs. The status of both products is similar in many respects to that of the recently developed rabbit adapted, hog cholera vaccine. Further research is necessary to determine the efficacy of these products. Desiccated or lyophilized strain 19 vaccine is being used successfully in this country. Desiccated vaccines have a longer period of usefulness than liquid vaccine when maintained under the same conditions. This is particularly true when the many adverse conditions encountered during transportation are considered. After desiccated vaccines are reconstituted, they should be used immediately.

At present, there are no reliable immunizing agents available for preventing *Br. suis* infection in swine or *Br. melitensis* infection in goats in this country.

Brucellosis in Sexually Immature Animals

Brucella infection in calves and kids is more transient than in pigs. Calves and kids are only mechanical carriers of the disease during the time they are nursing infected dams and for a short period after weaning. These animals can be placed in clean premises with safety after they have been held in quarantine for two or three weeks after weaning and are negative to the blood agglutination test. The picture is slightly different in pigs. Suckling pigs may become either temporarily or permanently infected and transmit the infection to susceptible swine after weaning. However, pigs showing no evidence of brucellosis at weaning time can be placed on clean ground for future breeding stock. Regardless of the species of animal involved, the most reliable source of Brucella-free herd replacements is the offspring that are raised on the premises.

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A new auction sale record was made on January 22, 1952, when Mr. J. P. Walker, owner of the Angus Valley Farm at Tulsa, Okla., and president of the American Aberdeen Angus Breeders Association in Chicago, sold Lackpeer 79th of Angus Valley for $60,000. The bull was purchased by Ralph L. Smith, of Chillicothe, Mo. This is the highest price ever paid for an Aberdeen Angus bull in a public auction. Mr. Smith had earlier purchased a black Angus heifer, Black Cat Bessie 6th of Sunbeam, which was sold at auction at the Sunbeam Farms, Miami, Okla. The price paid of $35,100. is a record for a female of any breed.

Brucellosis Control And Eradication*

A. L. BRUECKNER,† V.M.D., College Park, Maryland

BRUCELLOSIS control and eradication was inaugurated on a national basis in 1934 as part of a cattle reduction program. At that time federal funds became available for the payment of indemnities and for veterinarians and trained laboratory personnel. Indemnity payments were contingent upon like payments by the states but were limited by federal statutes.

Rapid strides were made in many states under the recommended procedures as long as economic conditions made cattle reduction a necessity. With the outbreak of hostilities in Europe and the entry of the United States into the war, there came a period of increased demand for meat and dairy products. This changed the economic picture so that commercial dairymen and commercial beef producers were no longer keenly interested in disposing of animals infected with brucellosis. The program of calfhood vaccination with strain 19, which was officially adopted in 1941, had a tendency to prevent some of the damage caused by the decrease in the testing program and the retention of infected animals.

Following the war there was an awakening of interest in brucellosis control because of the increased importance of undulant fever in man. An outgrowth of this interest was the appointment of a National Committee on Brucellosis Control, with representation from the veterinary and medical professions and from livestock and agricultural organizations. A special committee of the U. S. Livestock Sanitary Association was appointed to prepare a report on the known facts about brucellosis in animals and man. Their report appeared as a booklet titled, What is Known about Brucellosis. This has been given wide distribution by all agencies concerned.

The promulgation of regulations covering the brucellosis status of animals for importation into states has maintained a constant stimulation of the control program. This has been most influential with purebred herds, but has not been a sufficient stimulus to promote the program to a successful conclusion on a national scale.

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†Director, Livestock Sanitary Service, University of Maryland, College Park.

Health Department Requirements Concerning Brucellosis

For several years health departments at the state, county, and city level have promulgated regulations requiring that all herds from which milk is sold for consumption in the raw state be brucellosis-free. These efforts, in general, were prompted by outbreaks of undulant fever traced directly to infected herds. Very recently there has been an expansion of health department regulations to cover large milk sheds and to require that within a definite period of years all milk for consumption in the fluid state, either raw or pasteurized, must come from disease-free herds, with a continuing program of control and eradication.

The Chicago regulation, in which a period of five years was allowed, is an outstanding example. The District of Columbia in August 1950, set forth a regulation that by August 1952, all herds from which milk is shipped to that market must be signed under one of the four plans of control recognized by the Bureau of Animal Industry of the U. S. Department of Agriculture. There are undoubtedly many more such regulations in effect with which the writer is not familiar.

These signs are of significance in indicating that this disease in animals must be controlled and eradicated. Dairymen who have not responded favorably to the story about the economic losses sustained by trying to live with brucellosis will take cognizance of this influence in their livelihood.

Species Susceptibility to Types

Any of the three species of Brucella may produce undulant fever. *Br. abortus* mainly from cattle, *Br. suis* primarily from swine, and *Br. melitensis* from goats, with cross infections between these species and the involvement of other domesticated animals, have built up a complicated picture in human and animal health, to make the whole problem extremely complex.

The veterinary profession has been aware that the disease in animals must be controlled through the combined efforts of veterinarians in official capacities and in practice. The position of chief livestock sanitary official in most states is filled by a veterinarian. In those

instances where the chief official is a layman, there is a staff of veterinarians in more or less direct control of programs. In only a few states are laymen employed on the state and federal control forces. The use of practicing veterinarians in the programs on a fee basis out of state funds is operative in more than half of the states. The basic reason for such a set-up is the more rapid eradication of the disease than has been possible under other systems. If this end is not attained within reasonable limits of time and funds, the profession will be in a vulnerable spot. The same will be true in those states in which the program is not pushed forward rapidly, whatever the method of approach.

In Maryland, the practicing veterinarians have never been put on a state fee basis in the tuberculosis or brucellosis control programs. There has been a continuing effort to keep the accredited and certified herd as the most important part of both disease programs. Probably Maryland has been in a fortunate position in this connection because of the milk requirements for an annual tuberculin test and the interstate shipment requirements of the principal market states for dairy and beef cattle. The official work, in general, has been concerned with placing herds under supervision until free of disease and then turning them over as accredited or certified for the accredited veterinarians. It cannot be stated that there has been complete satisfaction on the part of practitioners in the state with this procedure, and it likewise cannot be stated that there have not been cases where official veterinarians have been guilty of overstepping the field of supervision.

In order to limit official work in herds as much as possible, new agreements have been formulated and have been approved by the BAI and State Board of Agriculture. The main point of difference in these is the setting forth of a two-year period for official calfhood vaccination in plans B, C, and D, after which the herd will go over to practicing veterinarians for future work at the owner's expense. In plan A, which is test and slaughter, testing and vaccinations will be continued by official veterinarians until the herd is certified as brucellosis-free, at which stage it will be turned over to the practitioner. The owner will bear the expense and deal direct with his accredited veterinarian.

Observations Of The Routine Use Of Cervical Cultures In Mares*

M. JOSEPHINE DEUBLER,† V.M.D., Ph.D., Philadelphia, Pennsylvania

THE ideal breeding program is directed toward maintaining fertility in an entire group of animals, rather than treating individual cases of sterility. Infections of the genital tract are an important cause of infertility. These are often of a low-grade type, without detectable lesions, and result in the problem of repeat breeders. In these cases, there usually is not absolute infertility of either the stallion or the mare.

In the stallion, varying degrees of fertility are commonly observed. There are relatively few highly fertile stallions. There is no means of increasing sperm production, but it can be decreased in several ways. The more services required of a relatively infertile stallion, the fewer mares will be settled. In the mare, there are two factors controlling fertility. One includes anything which will prevent fertilization of the egg. It has been shown in man[1] that certain organisms have a spermicidal effect, although pathological changes are not evident. The second factor is the presence of any condition which might interfere with the implantation of the fertilized ovum; particularly any infection involving the uterus.

The value of cervical culture lies in its usefulness in detecting those mares which are carriers of potentially pathogenic bacteria. These are chiefly *beta* hemolytic streptococci, and the term "infected mare" as used in this paper refers to mares infected with organisms of this group.

It is believed that in order to have a successful breeding program, infection of the genital tract must be eliminated. To do this means that every mare must be cultured before breeding and no infected mare allowed service. Barren and maiden mares are cultured and

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treated, if necessary, before the breeding season begins. Maiden mares may be infected even though they have never been bred. Foaling mares are cultured just before breeding. It is preferred to culture mares when they are just coming in heat. The semen of the stallion is cultured before the beginning and about once a month during the breeding season. If hemolytic streptococci are present in the semen, the horse is rested and treated with penicillin. In this connection, a period of seven days of rest is prescribed and 3,000,000 units of penicillin administered daily for three days. Clinical symptoms have been observed in two stallions. These horses were slow in serving mares.

Procedure

Cultures are taken, preferably in duplicate, with cotton-tipped, wooden applicators. Applicators are prepared by placing in glass test tubes and sterilizing in the autoclave. The tail is bandaged, the external genitalia washed with a soapy, antiseptic solution and a speculum inserted. A Knowles forceps is used to grasp the cotton-tipped applicator, which is inserted through the cervix and then replaced in the tube. The speculum and forceps are sterilized by boiling.

Swabs may be mailed to the laboratory. Media need not be inoculated immediately but this should be done as promptly as possible. During the breeding season, immediate laboratory work is necessary to assure cooperation of the breeder. Laboratory procedure is to place the swab in infusion broth for one hour at 27 C., then streak the swab on a blood agar plate (10% horse blood) and on an S S (Salmonella-Shigella) agar plate. In positive cases, hemolytic streptococci are visible in 18 hours. For practical purposes, *beta* hemolytic streptococci are considered to be the important pathogen, so a mare cultured and found free of this infection may be bred the following day. Plates, however, are held in the incubator for 48 hours to see if slower growing organisms are present.

Before the method herein described was adopted, other methods were used and found unsatisfactory. Cultures were taken with a wire loop and culture media inoculated immediately. This was found unsatisfactory because many cases negative by this method were positive when cotton swabs were used. Washing off the cervix with sterile saline was tried, but this method was discarded because of mechanical difficulties, involving particularly the thick cervical mucus which made it difficult to aspirate material.

In the series included in this study, a total of 234 individual mares were cultured. Of these 132 (56%) were negative. If care is used in collecting samples, common contaminants can be avoided. It has been concluded that no bacteria are normally present in the cervix of mares.

From 81 (35%) of the 234 mares, *beta* coliform group or *Streptococcus viridans* were demonstrated. If found on repeated cultures, this was believed due to fecal contamination and usually was found in old mares with relaxed vaginas. Surgical correction of this condition (suturing) was necessary before cultures from these mares were negative.

From 81 (35%) of the 234 mares *beta* hemolytic streptococci were identified. Of these mares, eight appeared normal when examined with the speculum and had no history of breeding difficulty. Seventy-three of the 81 infected mares were problems. The vagina and cervix were usually bright red when examined, heat cycles were irregular, some came in heat regularly but did not conceive on repeated services, and others had abnormally long heat periods. This latter group included mares diagnosed as having cystic ovaries but the heat cycles became normal when the infection was controlled. It is believed that these mares were showing false heat due to irritation produced by the infection.

Four mares were infected with *Corynebacterium pyogenes*. In each case this was associated with purulent metritis.

Two mare were infected with a hemolytic Staphylococcus.

No organisms of the Salmonella group were found.

Forty of the *beta* hemolytic streptococci found were typed on the basis of production of acid in trehalose and sorbitol broth. Three distinct types were found.

Three strains produced no change in trehalose or sorbitol. These could have been *Streptococcus equi* and were found in maiden mares.

Eleven strains produced acid in trehalose but not from sorbitol. These were believed to be the so-called large colony Human C.

Twenty-six strains were negative in trehalose but produced acid in sorbitol. These were probably the so-called *Streptococcus genitalium*.

No organisms were classified serologically.

A mare may be a resistant carrier of one strain and breed regularly and produce normal foals. However, such is a potential source of

infection to others. Such mare may become clinically infected if another strain is introduced, or something happens to lower her general resistance.

Results Obtained on One Farm

As an example of the results with a program of eliminating Streptococcus infection on one farm, the following history was taken early in 1950.

During the breeding season of 1949, 50 mares were bred, and of these 42 were in foal at two months (rat test). Of these 42 mares, 14 aborted and four foals died within a few days of birth; there were 24 weanlings in 1950 from the 50 mares bred in 1949. Ten of the 14 mares that aborted developed ophthalmia within a few months after abortion. In 1949, only barren mares were cultured, and these were treated by suturing the lips of the vagina.

During the breeding season of 1950, almost all the mares and some of the stallions were cultured. There were 54 mares to be bred and of these 27 were infected. Four of the infected mares did not respond to treatment and were not bred. Of the 50 mares bred, 40 were in foal at two months. Of these 40 mares, two aborted (one twins) and one foal died (dystocia). In 1951, there were 37 weanlings from the 50 mares bred in 1950. There was one new case of eye trouble.

During the breeding season of 1951, all mares and all stallions were cultured. Fourteen of the mares and three of the stallions were positive. Fifty-six mares were bred and 50 are in foal at this time. There have been no abortions to date and no eye trouble among the mares.

Thirty-seven of the 41 infected mares were treated successfully by instilling 4 oz. of hexylresorcinol in oil (caprokol oil®) directly into the uterus, using a piece of rubber tubing attached to a syringe. Only one treatment was necessary. The mare was recultured not less than two weeks later, preferably on the first day of the next heat period.

The four mares which did not respond to this treatment were retreated with a suspension of 500 mg. aureomycin in oil. All of these became negative and conceived.

Purulent metritis was diagnosed in eight infected, barren mares. These were given 100 mg. of stilbestrol in oil in the vagina. Aureomycin in oil was given a few days later. This was repeated every three weeks until cultures were negative. Six of these mares are now in foal.

In a sound breeding program, it is obvious that culturing is not the answer to every problem. It is a lot of hard work and requires close cooperation between veterinarian and management.

A mare which has had difficulty in foaling, or has retained the afterbirth longer than normal, should not be bred on the foal heat just because the culture is negative. Infection enters easily through damaged tissues and if there are bruises or tears, do not take the culture until after they are healed. Negative cultures have been determined where there is profuse uterine discharge.

Summary

From the results obtained, it is the opinion that every mare should be cultured before breeding in order to detect an important cause of sterility, abortion, death of foals, or weak foals.

If the mares and stallions are free from infection, the number of services required for conception is reduced and the heat periods of the mares are generally shorter and more regular.

Cervical culture should be used after all abnormalities have been corrected to determine whether a mare is ready to breed.

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New Chemical Stimulates Weight Gain in Swine

A low-cost chemical manufactured from fatty acids by Armour & Company has indicated, in preliminary trials, to have growth stimulating properties when added to hog rations.

The agent is an ethomid, trade name for a series of non-ionic, surface active agents used as detergents and emulsifiers.

Researchers at Michigan State College report that in a controlled experiment a group of pigs receiving a ration to which the new product had been added gained an average equal to those fed aureomycin.

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Prolonged consumption of large quantities of trichloroethylene extracted soy-bean oil meal has produced lesions of disease in cattle. —*Rue Jensen, D.V.M.*

®Sharp & Dohme, Inc., Philadelphia, Pa.

Antibiotics In Sterility*

M. G. FINCHER,† D.V.M., Ithaca, New York

THE subject of antibiotics was well summarized by Dr. S. F. Scheidy (*Jour. Am. Vet. Med. Assn.*, 118:213 [Apr.], 1951), although a few new agents have come into use since that time. Doctor Scheidy stated, "Antibiotic therapy generally is used to refer to the use of antibacterial substances, produced by microbial organisms, in the treatment of disease." He mentioned the ones currently used, including tyrothricin, penicillin, streptomycin, bacitracin, aureomycin, chloramphenicol (chloromycetin®[1]), and terramycin. Since then, neomycin and polymyxin (aerosporin®[2]) have received limited trials.

It would be difficult to discuss the broad subject of infertility and refer only to antibiotics in connection with it. The general principle, established by W. L. Williams, must be stated that sexual rest for several months after parturition, especially if parturition was abnormal in any respect, increases the chance of fertility. This is stressed again and again by workers today. A study of 1,674 pregnancies in 593 cows in the University of Illinois herd indicated that "fertility increased as the interval between parturition and first service increased up to 100-120 days."

Clients should be encouraged to stop breeding dairy cattle earlier than 80 to 120 days after calving. Perhaps beef breeds would do better if bred a little earlier. It is urged that during this period the genital tract be examined repeatedly and given the type of treatment which seems indicated in the individual case. Some cows require antibiotics at this stage as a prevention of sterility. The writer has employed tyrothricin in this connection as a routine treatment of retained placenta and metritis for several years, and has also used it in some cases after the uterus was apparently normal, but before the cow was bred.

Diagnosis

Dilation of the vulvovaginal border from difficult calving, usually at first calf, causes considerable trouble, especially in Holsteins. Closing the vulva ventral from the dorsal commissure for two-thirds of the total opening, by modified Caslick operation, will do more good than antibiotics alone. Selecting this procedure is a problem of diagnosis. Infusion with suitable antibiotics will assure more successful results of surgery in overcoming sterility.

Severe vaginal irritation from any cause may be detected by the use of the hand or a pyrex glass vaginal speculum. Attention to asepsis cannot be overemphasized when placing any agent or instrument into the cow's vagina, cervix, and uterus. Careless technic and pushing such material as lime, feces, and other debris that may adhere to the external genitals into the genital canal or uterus on examination or treatment, may result in active infection.

Trichomoniasis, vibriosis and faulty nutrition of cows or bulls can escape attention in a hurried diagnosis of a few (20%) of the individual cows in a herd. Siphon or aspirate a little mucus, with the aid of saline, from suspected uteri in such herds for laboratory examination. Make semen examination and treat the bull if indicated.

The writer's attention was directed recently in an impressive manner to the problems of diagnosis. Rectal examination of a cow to determine whether or not she had a 48-day fetus or pus in the uterus made the difference between a diagnosis of pregnancy or trichomoniasis. Another veterinarian and the writer were sure that this uterus was not pregnant at 48 days but that an ounce or more of fluid was present in the end of the right horn. An ounce of saline was infused and siphoned off and from this a large number of active *Trichomonas bovis* organisms were recovered. By looking at the vagina with a good glass speculum and palpating the vaginal mucosa with the bare hand, a "rasp-like" sensation was noted, typical of trichomoniasis and no other disease. Had this particular diagnosis been missed and the pronouncement made, "possibly pregnant, re-examine in a month or two",

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[1]Parke, Davis & Company, Detroit, Mich.

[2]Burroughs Wellcome & Co., Inc., Tuckahoe, N. Y.

which is the usual procedure on the part of many veterinarians, infection in this herd would have gone undiagnosed.

Another example of how important it is to make an accurate diagnosis in sterility work is seen in early pregnancy diagnosis. There are a few men in the United States who specialize in breeding diseases. Such specialists become very skillful at telling whether a cow is pregnant after 30 to 40 days and, of course, with greater ease after 45 days. Practitioners should not hesitate to examine cows at 30 to 40 days after breeding because many of those animals will be found either definitely in heat on that day and be treated, or they will be found definitely pregnant. Admittedly, some positive early pregnancy diagnoses will come into estrum later, but this does not mean that examination caused abortion. Rather, a mistake was made in diagnosis or abortion occurred because of other disease or unobservable abnormality.

An unpardonable error of diagnosis is to fail to make positive determination of pregnancy 45 or more days after breeding and to use some uterine infusion, such as ones to be described later, after breeding and cause an abortion. This can be prevented by bearing in mind that a cow exhibits three signs of pregnancy after 30 days. One is that the corpus luteum is easily palpated in the ovary, there is greatly increased pulsation in the uterine artery, and there are fetal membranes which slip between the first or third finger and the thumb and then the dorsal uterine wall slips immediately after that. In other words, if you pick up a small portion of the pregnant horn, such a membrane can be identified any time after 40 days. Between 30 and 40 days, it is usually a matter of picking up the entire uterus and palpating a bulge, resembling a vesicle, in it.

Caution must be exercised and treatment of any kind be delayed until a thorough examination has been made. A cow whose uterus seemed fairly normal was examined; vagina and cervix were clean, but on palpation of the ovaries it was noted that they were "tied down." There was definite cystic distention of the oviduct on each side which made the cow totally and hopelessly sterile. She had been treated repeatedly with various infusion agents, including penicillin and streptomycin in penicle®. These infusion agents were totally ineffective. Had an accurate examination been made this cow would have been judged sterile.

Salpingitis is sometimes difficult to diagnose. A fat Holstein had been examined several months earlier and noted to have a "crooked, tortuous cervix." Difficulty was experienced in inserting a catheter or an infusion agent. Instructions were left with the attending veterinarian to treat and breed her at each heat. This procedure failed to produce pregnancy so she was sent in for re-examination. A casual examination was made with the finding that the ovaries were difficult to palpate. The rectum had several inches of fat around it, the uterus was fairly normal but the cervix appeared abnormal as previously determined. Vigorous treatment included, among other agents, 3% Lugol's solution in the uterus. This case is cited because there is a possibility that salpingitis was produced by the active treatment. Several persons have stated, however, that antiseptics such as Lugol's solution injected into the uterus and left there will cause cystic distention of the oviducts. After several days, both oviducts were completely cystic; the cow was absolutely worthless for breeding.

Treatment

The problem of uterine irrigation and infusion has been the subject of discussions for many years. There have been times when almost the only persons using such things as 3% Lugol's solution or chlorine solution in the uterus were Dr. Folmer Nielsen of Copenhagan and other prominent Europeans. Perhaps a few others, like the late Dr. C. H. Case, and some of the students of Doctors Udall and Williams, continued to douche all sterile cows. Doctor Udall still obtains good results with uterine irrigation.

It was found that leaving the uterus and cervix of sterile cows alone and relying on massage of ovaries, oviducts, uterus and cervix, with some vaginal treatment, was less harmful and more cows bred than when the rough treatment was used. This is more especially true of the United States, as many of the better men in Europe like Dr. Gustav Danelius and the late Doctor Nielsen made wide use of iodine for uterine irrigation.

It is my personal opinion that little harm or good has followed such treatment. Rather good results have followed vaginal dusting, or the application of acriflavine jelly rubbed well into the cervix, vagina, or vulvar mucosa as needed. Hormonal treatment was usually added to the regime and rough treatment (enucleation of corpora lutea that were difficult or irrigation or swabbing of cervix and uterus) were passed up as rather hard work that accomplished little in most herds.

®Wallace Laboratories, Inc., New York, N. Y.

Since artificial insemination has been so widely employed it became apparent that infertility was attracting more than usual attention. Such diseases as vibriosis, cystic ovaries, and the repeater cow from all causes demanded attention of a different sort than had usually been given to these problems.

Those interested in artificial insemination were rocking on a narrow edge between complete failure and half-hearted success. Salisbury, Almquist, and others, proposed the use of antibiotics in semen diluter. Recommended was 1,000 mg. of streptomycin and 300 units of penicillin per cc. of diluted semen, plus the usual trace of some sulfonamide. Bulls of low fertility immediately proved effective breeders. Similar mixtures had no harmful effect upon semen from fertile bulls. It was after these antibiotics came into general use and after semen was protected from the shock of being added to cold diluter that fertility in the cows bred artificially improved to a point where managers of artificial breeding associations could breathe a sigh of relief.

It was pointed out in these studies of antibiotic treatment of semen by Easterbrooks of Connecticut that 500 mg. of streptomycin per cc. of diluted semen would prevent the growth of *Vibrio fetus* when inoculated into a suitable medium. It was, therefore, reasoned that placing semen with diluter containing 0.3% sulfanilamide with penicillin and streptomycin in the uterus not only freed semen from pathogens, but had some effect upon the pathogenic microorganisms in the uterus. This soon proved to be wishful thinking. Infertility, due to vibriosis, trichomoniasis, or some other disease, was not resolved after infected cows were being inseminated with treated bull semen, although the over-all effect on the kind of cattle inseminated down the road was better.

Soon everyone was talking and some men were writing about apparent success with uterine infusion with various agents. The infusion of infected udders had given such spectacular results that this may have had some influence.

McAuliff stated that his treatment of vibriosis was as follows: As soon as the infection is discovered in open cows, place in the uterus 0.5 gm. streptomycin and 400,000 units penicillin in a water-in-oil emulsion of normal pH. At next estrum, while the cow is in heat, infuse with 1 gm. streptomycin in 30 cc. water and breed six to eight hours later.

He had also tried, with surprisingly good results, intramuscular injection of 1,500,000 units procaine penicillin twice daily for five days. One cow about to abort, failed to abort, after this treatment.

In another herd, ten cows and one bull which were believed to be infected were given the same high level dosage. Nine of the cows conceived at first service to an infected bull.

Easterbrooks and Plastridge (*Jour. Am. Vet. Med. Assn.*, 117:388, 1950) reported upon a small controlled experiment with six sterile "repeater" cows, which were in a vibriosis problem herd. Each had been bred four or more times. Three were treated while in heat with 1 gm. of streptomycin and 200,000 units of penicillin in 20 cc. water-in-oil emulsion. Each was bred and conceived at next heat. Three untreated did not conceive promptly. Of course, it must be stated that time does a lot of "curing" of so-called vibriosis and many that were diagnosed as Vibrio infected herds were actually not infected. The inaccurate agglutination test probably led many astray. At any rate, these investigators report upon two cases from another herd with the same herd and case histories, in which 1 gm. of streptomycin in 15 cc. of water was effective.

At the writer's suggestion, Woelffer tried aqueous tyrothricin in dairy herds in Wisconsin and the Middle West and made a preliminary report upon his results using 100 cc. in each horn. His report shows (*Jour. Am. Vet. Med. Assn.*, 116:425 [June], 1950) that 22% of 75 untreated cows conceived, while 62% of 29 cows that were treated either with 3.5% Lugol's solution or with aqueous tyrothricin conceived. He reported a complete absence of an annoying amount of straining when tyrothricin infusion was used. It is interesting to note that three cows bred 18 and 19 times conceived rather promptly after treatment. Other treatments for cystic ovaries had been used previously without apparent effect.

At a later report (*Vet. Med.*, 46:253 [July], 1951), Woelffer stated that in the treatment of cows with cystic corpora lutea small doses of thyroid extract (3 gr. daily for two weeks following service) provided stimulation for the pituitary. He then added that infusion agents were helpful in sterility work and should be placed in the uterus three days before service. The use of 25 to 40 cc. of oily agents like hexylresorcinol (caprokol®) or 50 to 250 cc. of aqueous antibiotics were effective if given at this time. He also believed it was satisfactory to use 100,000 to 300,000 units crystalline penicillin in 10 to 20 cc. of water at estrus, allowing service a half day later.

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Various clinicians have used 200,000 units crystalline penicillin in 10 cc. of water and have injected it by way of a plastic or glass insemination tube directly into the uterus eight to ten hours before service. This must be done carefully or it will result in hemorrhage and probably prevent conception. This is possible and especially likely to occur if a metal catheter is clumsily used. (The type catheter designed by Nielsen is the easiest to insert if metal is to be used. It is round and smooth on the end. The Woelffer catheter is similar but smaller.) The penicillin or tyrothricin is infused at the peak of heat and the cow bred at the next heat. In this schedule, if the catheter causes a little bleeding or other mutilation of the uterine or cervical mucosa, it will do no harm. It will have longer to act before a fertilized ovum is expected to adapt itself to the uterus.

In practice, one treats cows for infertility when he has time and when it is convenient. Uterine infusion, using the Danish, Chamberlain, Roberts, or Woelffer catheter, is possible at any time before, during, or up to three days after breeding. It should not be done sooner than six hours after breeding. The work of Salisbury and his associates shows that sperm reaches the ovary in 2.5 to 5 minutes after copulation or after insemination into the body of the cervix, and indicates that no harm would be done by infusing the uterus ten minutes after service; though it is not suggested. One or two days later would be a good time. Three or four days are required for the fertilized ovum to appear in the uterine horn.

Easterbrooks believes, with some others, that 1 gm. of streptomycin in 20 to 50 cc. of distilled water is an ideal agent and should be placed in the uterus four days before breeding. The writer has used 1 to 2 gm. streptomycin, plus 200,000 to 500,000 units penicillin in 20 to 100 cc. of saline, a few days before breeding and as early as three weeks before breeding, with good results. Many think that 40 to 100 cc. of aqueous tyrothricin (containing 0.3 mg. to 0.5 mg. tyrothricin per cc.) injected at one heat period, with breeding at next is ideal. A combination of the three (penicillin, streptomycin and tyrothricin) seems effective. It does not make a clear solution and streptomycin is not compatible with tyrothricin. The aqueous form of streptomycin makes the infusion and preparation of infusion agents much easier and faster than using the crystalline form. The whole lot of antibiotics should be kept cool after they are in solution in water or preferably should be used at once.

Polymyxin, 500 mg. per cc. of diluted semen, has been used experimentally with no apparent bad effect upon semen and has lowered the bacteria count and increased the viability of semen to a point where Foote and Bratton at Cornell thought that it would no longer be necessary to keep semen cool. This suggests that this agent, which has been used as an udder infusion, should be used to infuse the uterus. Most agents are rather promptly expelled by a reasonably normal uterus unless they are placed in an oily vehicle. It is often desirable to have an aqueous agent that is promptly expelled and one that is not irritating.

Some cows have been successfully treated, however, by using 20 to 100 cc. of an oil-in-water emulsion of pH 7.0 to 7.4 as a vehicle for an appropriate amount of penicillin or penicillin and streptomycin, leaving it in the uterus. This has worked well after pyometra has been overcome partially. Either may be repeated at two to ten-day intervals as indicated for infected uteri. Stilbestrol and posterior pituitary extract are helpful in effecting expulsion of uterine contents. Antibiotics are not indicated until the organ has been relieved.

One should not attempt to breed a cow that is infused with penicillin in an oily base or in an oil-in-water emulsion sooner than ten days after treatment. Some of the oil might be retained for several days.

It is not the purpose of this paper to infer that 50 to 100 cc. of 1:1,000 aqueous acriflavine is not useful just because newer antibiotics are harmless and appear to have value; nor is this paper intended to imply that a careful diagnosis and proper use of hormonal therapy is to be overlooked in treatment for infertility.

Summary

Good results may be secured by the use of properly applied antibiotics such as tyrothricin, penicillin and streptomycin and apparently no harm can result from their proper application to the genital tract. Greatest care as to asepsis should be used.

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Bovine leptospirosis infection causes lesions of focal interstitial nephritis. Economic losses due to reduced milk production in adults and interference in the ability of young growing animals to gain are considered to be greater than losses by deaths.—*James A. Baker, D.V.M.*

The Veterinarian's Responsibility In His Community's Public Health*

JAMES SCATTERDAY,† D.V.M., Jacksonville, Florida

MODERN public health as it is practiced today covers a broad and complex field. Science endeavors to utilize all known methods for the prevention and control of disease in the human and animal population. In order that this may be accomplished, all related professions are pressed into service. Medical men unaided, cannot carry on a modern public health program. Such a program requires the cooperation and active participation of many professions; physicians, sanitary engineers, dentists, chemists, bacteriologists, parasitologists, pharmacists, nurses, statisticians, and of course, veterinarians. The role of the veterinarian in public health is an important one. Indeed, veterinary medicine has much to offer a modern public health program.

Veterinary public health is not of recent development. Many local health departments, in the early days, were chiefly concerned with the quarantine of infectious human diseases and inspection of milk and meat products. These latter functions were carried out by veterinarians. In Florida, the State Board of Health, during the Spanish-American War, had a veterinary program for the control of glanders. In 1904, the State Board of Health employed a veterinarian, who was also a physician, to investigate and eradicate the diseases of animals communicable to man. Again, the principal diseases of interest were glanders, rabies and bovine tuberculosis. In 1911, the state legislature in Florida passed an act providing for the prevention and control of dangerous, contagious, and infectious diseases in domestic animals. It imposed certain duties and conferred certain powers upon the State Board of Health for such purposes. It also instructed them to employ a skilled veterinary surgeon to be known as the Veterinarian of the State Board of Health. Other diseases with which the state veterinarian was concerned included blind staggers, Texas fever, and bovine hookworm, as well as glanders and tuberculosis.

As can be seen, veterinary medicine, the medical profession, and public health have been closely allied for many years, although not until recently have they again been organized to work closely together. For example, the recent outbreak of anthrax in Florida, is being brought under control by the united efforts of the Livestock Sanitary Board, the State Board of Health through the local county health unit, and practicing veterinarians. One veterinarian, a representative of the State Livestock Sanitary Board, is in charge of all information which is pooled. He alone speaks to the press and to the public regarding this situation.

Public Health and Agriculture

The veterinarian is also a link between public health and agriculture. Animal health has long been a concern in the economics of agriculture. However, in recent years, disease hazards on the farm have brought animal health to the attention of public health workers. Some animal diseases have little, if any, economic significance, inasmuch as they do not interfere with the production of animal products, but are of definite importance to public health. Brucellosis cannot be considered as an economic animal disease alone. It is a serious disease of man. Rabies not only affects dogs and other livestock, but is a killer of human beings. That this dreaded disease still exists, when control measures have been known for many years, is a disgrace not to veterinarians alone but to the public who permit their love for pets to over-balance better judgment in the application of proper control measures. Leptospirosis, or Weil's disease, is becoming an increasing problem in dogs and in cattle, with human infections possible, if not proved. Tularemia is sometimes found in dogs, as is Rocky Mountain spotted fever. Salmonella infection in dogs has proved to be a source of human infection. These are but a few of the animal diseases which have direct bearing upon human welfare.

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It has been customary frequently to measure the effect of an animal disease on the basis of monetary loss to those who own the animals, or the cost to the taxpayers who supply the funds for its prevention and control, but the direct or indirect effects on human welfare are rarely measured.

Rabies vaccination, or the Pasteur treatment, is a very good example of this. It is not only costly, but painful to the person taking the treatment and is not without danger in itself. Doctor Sellers of the Georgia State Board of Health (1947) recorded seven cases of vaccinational paralysis among 50,000 persons treated with the phenolized fixed virus. Of these, five individuals had been treated with rabies vaccine previously, and only one of these patients had actually been bitten by a known rabid animal. Had these animals been observed by veterinarians, six of these cases of paralysis might have been avoided.

Animal diseases extend into urban areas through food products of animal origin, and as occupational disease hazards. The control of these food-borne diseases by adequate inspection of meat and dairy products is practical. Federal, or Bureau of Animal Industry inspection covers only those products intended for export and interstate shipment. Several of these federally inspected abattoirs in the past few years have had to drop this type of inspection to meet competition of those under poor state or municipal inspection, or none at all. In some of these and other meat processing plants, unscrupulous operators substitute cereals and other materials for meat with no regard to labeling, nor to the nutritional requirements of the consuming public. Horse meat has become a not too uncommon ingredient.

The practicing veterinarian, in his routine daily duties, may be called upon to conduct inspection at slaughtering establishments by antemorten and postmortem inspection of meat animals. Unless he intends to do, and does, a completely competent job, it is better off undone. A half-hearted, incomplete inspection gives the public a false sense of security and does much to distract from the professional standing and prestige of the inspector in his community. There should be definite correlation between the postmortem findings in these abattoirs, whether municipal, state, or federally inspected, with the agencies who are charged with the control of infectious and contagious diseases within their states. In many states, this lack of coordination of information has handicapped or retarded the investigations of disease outbreaks.

Milk Inspection

Milk, possibly, receives more inspection and supervision than any other food as it is not only the nearly perfect food for both old and young, but also a good media for the growth of bacteria, some of which may be pathogenic. One only has to read the milk ordinances written in the first quarter of the 20th century to see the importance which was placed on a healthy cow. It is alarming to note in many of the larger milk sheds in the country today, the lack of attention given to the health of the herds which produce fluid milk. The United States Public Health Service, in its milk ordinance and code, places more emphasis on herd health than on any other feature. This code is the basis for the majority of municipal and state milk laws today. Lack of emphasis upon a healthy herd can be attributed only to the change in types of personnel supervising the dairy industry. Veterinarians are in a great minority in this field which they pioneered and developed. A new type of sanitarian has taken over, usually a layman trained or untrained, politician or nonpolitician, placing his faith in pasteurization and platform tests, most of which are manually operated and are only as good as the man operating or conducting them.

Health officers are becoming aware again of the part that the veterinarian should play in protecting the health of the people, and many state boards of health are adding veterinarians to their staffs, usually in the Bureau of Preventable Diseases, to work as a team with physicians in this department. They also collaborate with the epidemiologist in the investigation and control of diseases of animal origin. The public health veterinarian acts as a liaison officer to the medical profession and the veterinary profession. He acts as consultant in the veterinary field to city and county health departments, promotes and encourages better control measures throughout the state, and in cooperation with and use of local practitioners promotes better public health locally. The local veterinarian is the authority on the status of animal diseases in his community. He is the only individual who is qualified by training and experience clinically to diagnose animal diseases. The veterinarian is a vital factor in the health of his community; those engaged in private practice are likewise engaged in public health work even though unintentionally.

It has been stated that the veterinarian in the course of his routine practice does more

(*Continued on page 206*)

Infectious Canine Hepatitis*

WALTER E. CARLSON,† B.A., Grafton, Wisconsin

DURING the last decade, understanding of the canine disease picture has advanced. Much has been done to clarify it. Formerly, a dog exhibiting symptoms of a purulent nasal discharge, emaciation, and diarrhea was generally believed to be suffering from distemper. Animals which became acutely ill frequently were suspected of having been poisoned.

Canine distemper is now recognized as a distinct entity; a disease caused by the filtrable virus of Carré; a virus which produces cytoplasmic inclusions in cells of epithelial origin such as the lining of the bronchioles, the bladder, and the kidney pelvis. It is, however, often complicated by secondary invaders which mask the virus invader. Leptospirosis now is also recognized as an important disease in dogs, which is progressively becoming more widespread. It is not only a serious disease in itself, but as Dr. James A. Baker has pointed out, it may activate latent distemper and produce nervous symptoms which do not respond to treatment.

During the last few years, still another disease has been recognized, which is of major importance; namely, infectious canine hepatitis. This apparently is quite widespread both in this country and parts of Europe.

Hepatitis also is a virus disease, caused by an organism so small that it passes through a Berkfeld filter; a virus which produces diagnostic inclusion bodies in the nuclei of cells of endothelial origin such as those lining small blood vessels in the brain and kidney glomeruli. Inclusion bodies are also common in hepatic cells. The liver thus becomes an important organ in making a diagnosis. Hepatitis is a resistant virus as compared with that of distemper. The latter virus dies after short exposure outside the animal body. Not so with the hepatitis virus. It also produces carriers, further complicating its control. In fact, it has been referred to as hog cholera of the dog world. Consequently, a thorough sterilization of pens must be practiced when this disease is present.

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Prevalence

It is difficult to estimate the prevalence of this disease, but a large number of practitioners believe that it is common in their areas. From observation of a large number of adult dogs purchased at random, it appears that at least 75% are immune. In other words, it is primarily a disease of young dogs, except for animals that are isolated as in some breeding kennels and homes. The average dog reaching adulthood has been exposed to the disease and developed an immunity. It is an ailment that the practicing veterinarian will encounter sooner or later and may find it hard to recognize.

Fig. 1. Typical pose of a patient affected with chronic infectious canine hepatitis.

Symptomatology

1. Incubation period is five to ten days. Animals are often restless and exhibit a change of attitude. Dogs that normally are friendly and want attention, shy away from people and want to be left alone.

2. Some animals show no gross symptoms. Puppies experimentally inoculated with infectious canine hepatitis develop temperatures of 104 to 105 F., yet appear perfectly normal. Such animals run and play like healthy pups. The next morning several may be dead.

3. A few will vomit, although this is not a common symptom.

4. There is usually a lacrimal discharge; watery in the acute stages and becoming purulent as the disease becomes chronic.

5. Nervous symptoms are not common. Few animals showing nervous symptoms have hepatitis. Those with a history of high fever and sudden death frequently show hepatitis inclusions. If nervous symptoms are present, convulsions are of the least diagnostic value. Lethargy and coma, on the other hand, are suggestive of this disease.

6. Inflamed tonsils, with the rest of the throat appearing normal, are indicative.

7. Pallor of buccal mucous membrane, becoming ashen grey in severe cases, is present.

8. Swollen submaxillary glands are of marked diagnostic value.

9. Death generally occurs early in the disease. There is ordinarily sudden death or a rapid recovery.

Chronic Form

1. The symptoms in this stage are so similar to those of chronic distemper that they cannot be distinguished clinically.

2. Animals appear generally ill and there is a rapid loss of weight, much more so than in distemper.

3. Vomiting is more common than in the acute stage. This is often associated with a mild jaundice. It is surprising that these symptoms are not more pronounced, considering the intense liver damage which occurs.

4. The watery nasal discharge has become purulent by this time and is similar to that observed in chronic distemper.

5. High temperatures have subsided and are near normal. The virus probably plays only a minor role in the chronic stage. The main factors responsible for symptoms are intense damage to the tissues, especially in the liver and kidneys, and the activity of secondary invaders.

6. Keratoconjunctivitis or white eye is a good diagnostic point if present. Unfortunately not many dogs show this symptom. It may last from a few days to several weeks and then disappear.

Symptoms mentioned are the ones most commonly seen in infectious canine hepatitis. Any combination of these symptoms may be observed in a patient.

In making a diagnosis on a live animal, it is suggested that the following be watched carefully:

1. The acuteness of the disease with high temperatures.

2. Leukopenia in uncomplicated cases. This is in contrast to leptospirosis which produces a leukocytosis.

3. Swelling of submaxillary glands.

4. Response to intravenous injection of glucose. If the animal is in a coma, glucose will often produce marked results, since animals develop a hypoglycemia due to intense liver injury.

Fig. 2. Illustrating typical keratoconjunctivitis; common sympom of infectious canine hepatitis.

5. As already pointed out, chronic cases are almost impossible to diagnose except in instances where a keratoconjunctivitis is present. A mild jaundice, however, should make one suspicious of infectious canine hepatitis.

Autopsy Findings

If death occurs, try to obtain permission for an autopsy. This is important when dealing with kennels where a correct diagnosis may save other dogs not yet affected. The gross findings in infectious canine hepatitis are as follows:

1. Subserous abdominal hemorrhages.

2. Serous or fibrinous exudate in the peritoneal cavity.

3. Sometimes free blood in the peritoneal cavity, caused by hemorrhages or a ruptured liver.

4. Liver is very friable and mottled and will often rupture on gentle handling.

5. Often a mild jaundice.

6. Submaxillary glands enlarged and edematous. Sometimes a few hemorrhages are present.

7. In a few cases there are subendocardial or subpericardial hemorrhages present.

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Cosmetic Ear Surgery*

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A SEARCH of literature relative to ear trimming or cropping, with possible reference to the important phase of postoperative care, has been discouraging. It is assumed, therefore, that many procedures in common use have been standardized by group discussions unpublished. It is not unreasonable to presume further that the journeyman "cropper" acquired his working knowledge through the medium of his guild. It would appear that these suppositions could be either directly, or indirectly, responsible for such a large percentage of ear trimming being done by lay operators.

While it is not the purpose here to criticize nor condone, the profession is confronted with a situation which cannot be ignored. Where the problem of local opposition occurs, veterinarians may be partially responsible for shunting a surgical technic into lay hands. Where such conditions exist, professional methods and results, considered and compared to those of the journeyman, might favorably alter opinion.

In defense of the veterinarian's primary lack of technic, a few facts having a bearing on the subject may be mentioned. Ear trimming is seldom discussed in the classroom or clinic. Available literature is so meager that individuals must develop their own technic, either with practice or by observation. With such lack of fundamentals, it is little wonder one approaches the first patient with timidity, realizing that while a good ear can be evaluated in terms of personal satisfaction, conversely, an unsatisfactory result may be not only the subject of condemnation but actually jeopardize the future status of the operator as long as the unfortunate patient remains in the public eye.

Age Factors

All candidates for ear trimming should be submitted to a routine physical examination; those found lacking in any respect, rejected with suitable corrective recommendations. While some surgeons operate, by choice, during the weaning period, the advantages found in anesthetic and surgical tolerance of patients ten to 12 weeks of age, far supersede any disadvantages.

Surgical Preparation

Preoperative morphine and atropine are optional. Pentobarbital sodium is the anesthesia of choice. Ophthalmic ointment should be instilled in the eyes to protect from soap used to cleanse the surgical field.

Clipping or shaving is recommended, but comparable end results have indicated little to choose between the clipped and unclipped ear. A clipped ear when scrubbed may become hyperemic, resulting in some postoperative discomfort. The presence of hair, if not too long, can serve advantageously as a structural support for taping. In long coated breeds and certain adults, clipping is necessary.

After scrubbing the ear flap, debris is removed from the canal, the ear flaps dried, then painted or sponged with alcohol, ether, and tincture of metaphen®. Adequate draping provides security against infection in any surgical procedure; ear trimming is no exception. To insure consistent results, protection of the operative area with drapes, towels or stockinette should be routine. At this stage, the line of excision may be injected (lateral surface) with 1:1,000 epinephrine solution for hemostasis.

Surgical Set-Up

Drapes—towels, stockinette and sponges; gloves—operator's choice; flexible plastic ruler and straight edge; skin marking pencil—sharpened to a fine chisel point, (this insures a thin, clean cutting guide); scissors— straight —for notching ear tip; scissors—straight—for trimming, (one edge should be corrugated to afford better control of scissors); artery forceps; towel clamps; two straight cutting edge needles; suture material no. 34—no. 35 stainless steel wire.

Procedure

While ear trimming is cosmetic surgery, actual procedure does not demand complicated technic. The operator, to qualify his ideal

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breed ear, should be able to visualize the end result on each patient. To materially aid that concept, it is well to observe individuals known to possess acceptable ear carriage, for relative contour, symmetry and length. Recording these mental observations will be of ultimate value in developing a consistent and individual technic.

Ear length is an important consideration and will vary with individuals, proportionate to the degree of cartilage rigidity, and texture. A soft, flexible structure necessitates a short broad ear, while conversely a firm or stiff cartilage may be trimmed somewhat longer and thinner.

As a guide in determining ear length, it is suggested that with the ears held erect, the anterior base be measured at right angles to the skull. This distance to each ear will give a reliable guide to length. With the ear still held in left hand, with normal relaxed tension, this distance is measured on the anterior portion from the skull upward to a point equivalent to the measured distance. Roughly, this point constitutes about two-thirds of length. A designation is made and with ears held together in left hand—centered perpendicularly above the skull—a notch is made to indicate the ultimate tip. This should be made with the scissors pointing downward and posteriorly.

Using the posterior notch of the tragus cartilage for the base guide, the plastic straight edge is approximated to the ear with a towel clamp. From this point, the straight edge is approximated in line to coincide with the notch previously made, indicating the ear tip, and again clamped. With the straight edge held firmly together between the thumb and fingers, the line of excision is marked plainly with the skin pencil.

Cutting line should be straight and well defined. With the opposite ear marked in a like manner, the ears should be viewed for symmetry. If asymmetric, they should be marked over again rather than attempting to overcome any difference later in the procedure. Approximating good symmetry at this stage facilitates the actual trimming and tends to prevent error. Until experience has been gained, this is an advantageous time to use the marked line of excision as a guide for the injection of epinephrine previously mentioned.

Actual trimming is a challenge and an incentive to become an ambidextrous operator. Lacking that facility, the writer usually starts at the base of the left ear, cutting upward along the marked line. The opposite or right ear is cut, starting from the tip and continuing downward to the base.

Forceps are attached to larger vessels, excised flaps are compared and any difference noted and corrected. The ears are viewed for symmetry and balance. It will be noted that even though the ear was cut on a relatively straight line, the conchal contour will present a pleasing appearance. The operator at this stage may alter contour and shape as desired. It should be remembered that contour and width will be proportionately thicker or broader with skin approximation and healing. An ear that appears a trifle fine and narrow at the tip, should, when sutured, balance out well.

All types of suture material have been discarded in favor of stainless steel wire. While tissue tolerance of steel is well known, the supportive value cannot be overlooked. There is little to choose, in the end result, between the use of a continuous locking or plain continuous suture. The latter is favored. Sutures are placed sufficiently close together (⅛ in.) to insure an even approximation. This close, even suturing will assure a thin healed edge, free of adhesions or scar formation.

Supportive and Postoperative Care

With suturing completed, the operative area cleansed and dried, the ear is ready for support. A 4″ x 4″ gauze pad is tightly rolled and one end placed firmly in the ear canal. Holding the ears in the erect position and in approximation with the roll, they are taped together starting from base to tip. The loose anterior fold of skin (devoid of cartilage) should be reflected backward on the hair side. This gauze roll procedure, supported with ½ in. widths of a stiff waterproof adhesive, is helpful to consistent end results. This adhesive backing is overlapped evenly with minimum pressure from base to tip. While the adhesive backing and roll provide support for an erect ear, the absorbent gauze assures an evenly distributed pressure that is so essential to rapid primary healing. Patient tolerance of this particular type of structural support is excellent and a definite advantage in developing erect ear carriage.

The first day following surgery, the original gauze roll is removed by slitting the tapes from the base upward. With litter mates chewing each other's supports, it is preferable to insert another roll and close. With a single pup, very often the adhesive backing is allowed

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The Veterinarian And Civil Defense*

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IT is possible that problems of civil defense have already interrupted the normal routine of your lives. Those responsible for carrying out civil defense preparations make no apology for their intrusion on your normal peacetime activities nor on your peace of mind. The writer is not qualified to say whether or not war is inevitable, nor when or where it will occur. However, your sober consideration of these sentences from the pamphlet United States Civil Defense[1] is invited.

"The civil defense program of this country must be in constant readiness, because for the first time in 136 years an enemy has the power to attack our cities in strong force, and for the first time in our history that attack may come suddenly, with little or no warning. Granted a few minutes' warning, casualties could be reduced by over 50% through proper organization and training. More important, civil defense could spell the difference between defeat with slavery for our people and victory in an all-out war thrust upon us."

To meet the exigencies of an emergency, an adequate program requires the mobilization of many groups with widely divergent skills and training, coupled with an integration of these skills into a smooth working organization which can act promptly and successfully in event of catastrophe.

One of these groups must be the veterinarians, and it is the purpose here to point out to you some of the civil defense problems which may face us in the future, for you, as veterinarians, have a professional responsibility in helping to maintain the health of this nation.

More specifically, your active participation is necessary in helping to solve the enormous task which confronts the Federal Civil Defense Administration. The Health and Special Weapons Defense Division of that agency is responsible for all the health activities of civil defense at the national level. The division is under the direction of Dr. Norvin C. Kiefer, with a staff consisting of physicians, dentists, veterinarians, sanitary engineers and other professional and technical health personnel. They consult with and receive assistance from scientific and professional personnel in the Bureau of Animal Industry of the Department of Agriculture, the Department of Defense, the Public Health Service, the Food and Drug Administration, the Atomic Energy Commission, and other federal agencies. It is the function of this division to develop recommendations for state and local civil defense health services—in other words, to provide guide lines and essential information for use by the states who are directly responsible for the development of their own civil defense programs. To better understand these relationships, veterinarians with civil defense health services responsibilities should study and be familiar with the publication, United States Civil Defense.

Your possible participation will be defined by the State Civil Defense organization, but the success with which the particular problems are met will depend entirely upon your voluntary efforts. There are, of course, many areas where we, both as a profession and as individuals, may be expected to play an important role. In some cases, the country will be dependent upon our particular skills alone for maintaining both human and animal resources. In other cases, we shall undoubtedly be in a supporting position to other medical experts.

Some of the major problems we shall have to be most aware of in an emergency are mentioned below.

Biological Warfare Against Animals

The effects of a widespread, successful biological warfare attack against our animal population would be difficult to estimate. It could mean extensive losses among those animals upon which we depend for meat, poultry and dairy products, to say nothing about our sources of wool, hides and certain medicinal items. Our health, strength and, in fact, our survival as a strong nation depend upon those products.

It should be remembered by everyone in the health services that biological weapons are relatively cheap and readily produced; they

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are easily concealed and are extremely adaptable to either sabotage or open warfare. Their use could be limited to local areas, which might be initially devastating, or in promoting panic and ruin on a large scale by perpetuating epizootics in widely separated areas.

There are, of course, many disease agents suitable for biological warfare. Among those which are now alien to this country are foot-and-mouth disease, rinderpest, Asiatic Newcastle disease and fowl plague. It is entirely possible, however, that animal diseases now found in the United States, such as hog cholera, anthrax and others would be disseminated. The danger from such diseases would be increased with the possible occurrence of mutations or variants in the organism. We cannot say what methods would be most suitable for successful biological warfare. Since we do not know, we can only be prepared for any exigency.

The normal veterinary services provided in peacetime constitute in themselves some of the procedures necessary for defense. This country is fortunate in having an effective system for controlling infectious diseases in our food-producing animals. But in event of emergency, several important measures will have to be taken to supplement our normal guards.

1. We shall have to institute a prompt reporting system of unusual disease or abnormal increase of more common diseases. Morbidity and mortality reports on some may be necessary. Such reports would be made to the state veterinarian, and would serve the purpose of hastening investigations to determine the nature of the outbreak.

2. We shall have to have federal, state, and local laboratories which are capable of making rapid diagnoses of both common and uncommon diseases.

3. We shall have to have assurance of prompt and adequate control measures, such as strict isolation and quarantine, to halt the spread of disease.

4. We shall have to be assured that steps are being taken to provide adequate prophylactic and therapeutic supplies, biological and medicinal, to meet an emergency.

Many of these items are already being acted on by civil defense authorities, by the Bureau of Animal Industry, Department of Agriculture, state veterinarians and state diagnostic laboratories. You, as practicing veterinarians, however, are the key men in this system of defense; especially insofar as ability to put it into operation depends on your alertness in spotting the unusual occurrence of disease in your areas and reporting it immediately. The prompt assumption of these responsibilities could spell the difference between control of a local or minor episode or an uncontrolled, widespread epizootic.

In this regard every veterinarian, if he has not already done so, should read What Veterinarians Should Know about Biological Warfare[8].

Defense Against Atomic and Chemical Attack

Veterinarians will also have to become familiar with the effects of the atomic bomb. An atomic bomb can cause casualties by three principal means; blast, thermal burns, and radioactivity. Each of these should be considered separately. Radioactive materials may necessitate a radiochemical examination of open foods, such as meats and poultry, a procedure which requires the use of highly specialized monitoring technics. This does not mean that a carcass of beef should always be discarded simply because of contamination as fission products do not penetrate deeply into materials[8]. All veterinarians should, however, be familiar with the conditions that determine the necessity for these procedures as well as those governing the disposal of food products which in themselves may be a radiation hazard.

Use of chemical warfare on man and animal also poses special problems of defense. Among many potential weapons which could be used in chemical warfare, the most likely would probably be nerve gas; it acts quickly, is detected only with difficulty, and may cause death in a few minutes to an hour. While it does not affect large areas, the persistent type of nerve gas may remain for hours or days. If such should be the nature of chemical warfare, exposed foods such as meat or milk can be dangerously contaminated. Liquid rather than vaporous nerve gas could cause dangerous and persistent contamination of water. While these are problems which must be attacked by specialists, the veterinarian in the field must be aware of all possible contingencies which will call the specialist into play.

Food and Milk Sanitation

Inspection of food products of animal origin is, however, a major responsibility of our profession. In peacetime, our system of milk sanitation, food and meat inspection is well qualified to meet any threats to the country's health. The possibility of enemy induced radiological, bacteriological or chemical con-

tamination—concomitant with mass destruction to our cities and relevant services of communication, supply, and storage, is another matter. Beyond some of the immediate problems already mentioned, we may be faced with loss of refrigeration, inadequate storage facilities, relaxation of sanitation procedures, destruction of food sanitation equipment and public water supplies, and the necessary use of untrained food handlers. These factors can all be magnified by the problem of mass emergency feedings.

In event of atomic warfare, in particular, we may be faced not only with shortages of food supplies in certain areas, but a good deal of waste insofar as nearby plants for refrigeration and storage of meats or for pasteurization of milk are no longer available because of widespread destruction. We shall have to find methods of diverting these supplies to other channels or preserving them in more durable forms.

Pet Animals

Among other considerations, we shall have to be concerned with pet animals. The care of pets at a time when tens of thousands of human casualties have occurred may well be out of the question, and owners might have to reconcile themselves to the fact that individual professional care could not be made available to injured or sick pets. Moreover, these animals could become a nuisance and a vicious menace in a catastrophe area, and provision thereby for the mass management of such pets is necessary. Local veterinary groups should organize and make plans to cover this problem. In some areas, veterinary groups of local civil defense agencies are utilizing humane societies for this purpose.

Zoo Animals

Adequate provision also should be made for controlling zoo animals by additional restraint facilities as a safeguard against escape of dangerous animals, especially following a bombing. As a further safeguard, adequate supplies of sedatives should be on hand.

Human Casualties

Our profession may have to be concerned also with human casualties. The present day training of a veterinarian would certainly provide him with surgical knowledge and skill which would be applicable to first aid and life-saving procedures for human casualties. By virtue of this, he could contribute much on the staff of a civil defense first aid station in the handling of casualties particularly in the hours immediately following a catastrophe.

This contribution of skills by the veterinarian will, however, be carefully considered in the light of other demands for his services. It is my understanding that dentists will be used as auxiliary physicians in civil defense, a significant reinforcement of the medical services since there is approximately one dentist for every two physicians. Further comparison of numbers shows that dentists greatly outnumber veterinarians, thus, veterinarians do not constitute a larger reservoir of professional personnel for the care of casualties. There are other functions which only members of our profession can perform. If these functions are covered in the local civil defense organization with an adequate reserve, then the remainder should be assigned to casualty services to work along with the other related professions, the physicians and dentists.

Other Veterinary Services

There is one veterinary activity which has not been mentioned; namely, research. The defense effort will have its impact upon those organizations carrying on veterinary research whether it be in federal or state supported laboratories or in private industry. There will undoubtedly be a change in emphasis for some of our present research activities. As an example, one might mention the special research, training and organization activities of the BAI in cooperation with the various state livestock sanitary officials.

More intensive research on problems dealing with infectious diseases in man has already led to a recent development of interest to the veterinarian in the research laboratory. The Public Health Service through the National Institutes of Health is in the process of organizing a sectional research program in microbiology. Although dealing primarily with man, it includes work on diseases of animals transmissible to man. In addition to research on human diseases, there are collaborating veterinary laboratories, either in state experiment stations, veterinary schools, or state diagnostic laboratories. Research in these areas will be incorporated toward development of better diagnostic methods, better vaccines and possible development of better control measures which could be valuable in either normal or emergency conditions. This program is being developed locally in each section with supplemental support from the research grants branch of the National Microbiological Institute of the National Institutes of Health.

Liaison is being, and has been maintained, with the Bureau of Animal Industry, in the development of this program. It is intended that the Bureau and the collaborating veterinary laboratories maintain liaison with the state veterinarian and the local Bureau representative in the various areas.

Such a program of research collaboration and technical aid may provide services capable of developing into a usable part of a civil defense operating program in the field of biological warfare, as determined by the Federal Civil Defense Administration or by such agencies as it may stipulate and by the laboratories concerned.

Those in general are the major activities which you, as veterinarians, and as American citizens must assume responsibility for carrying out. A certain amount of broad training will be needed, particularly against special weapons. Highly specialized training may be required for specific assignments. General training courses for physicians, dentists, veterinarians, nurses, and other health personnel have already started in some areas, and more will be developed soon. It is important that you enroll and attend. All of you are urged to procure and read the guide book put out by the Federal Civil Defense Administration, Health Services and Special Weapons Defense[4]. It can be procured from the Superintendent of Documents, Washington 25, D. C. Chapters 1, 14, and 18 are of particular importance. Technical manuals are now being prepared on emergency food and milk sanitation, biological warfare defense and others. A number of brief pamphlets published for the general public are as follows: This is Civil Defense, Survival Under Atomic Attack, What You Should Know About Biological Warfare, and Emergency Action to Save Lives, which contains a list of items recommended for civil defense, home first aid kits. All of you should be acquainted with these.

An attempt has been made here to give you a general idea of the problems confronted by civil defense and the role that you will be expected to carry out.

Our civilian population, our animals, and crops, were not attacked in the last war; they may well be in the next. The balance of power to win two world wars has come from the farms and factories of America. The enemy knows this and that if a third world war occurs, he will have to destroy these assets in addition to killing American men, women and children until we are too weakened and demoralized to continue a war.

We must assume that any potential enemy has the planes and submarines to launch attacks against us at any time; it would be impossible to stop them all. They undoubtedly would have atomic bombs and other weapons for such attacks.

Civil defense by civilians under civil authority is the answer to attack on our home front. If you wait until actual war comes to this country it will be too late. Preparation must begin now, if not already started, and maintained as long as threat of war hangs over the world.

To peace-loving Americans, this is a distasteful task, it will create burdens in many ways, it will demand sacrifices on the part of each of us, but when we realize our homes, our lives, our democracy, are at stake, certainly we will all do whatever is necessary to make the civil defense program work.

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For the year 1951, the total volume of cases of communicable diseases reported weekly by the states to the Public Health Service increased over that reported in 1950. Most of the increase was due to a higher incidence of measles in 1951. Other diseases such as diphtheria, smallpox, and typhoid fever showed moderate to substantial decreases. Smallpox was 60% below 1950; diphtheria, 30%; and typhoid, 10%.

A higher incidence of anthrax, infectious encephalitis, malaria, meningitis, scarlet fever, and streptococcal sore throat was reported in 1951 compared with the previous year. Coincident with an increase of anthrax in man was a high prevalence in animals in various parts of the country. Anthrax was reported in such widely distributed areas as New Jersey, Ohio, Illinois, Wisconsin, California, Texas, Oklahoma, Arkansas, Kentucky, Tennessee, and Florida. Cattle and swine were the animals most commonly involved, with a few horse and mule cases also being reported.

Research On Internal Parasites Of Cattle*

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RESEARCH on parasites and parasitic diseases of cattle has been and is rather limited. We are inclined to ascribe this, at least in part, to the fact that this type of research is very expensive because of the cost of necessary experimental animals. However, other reasons may be that in many cases these parasites, even when present, do not constitute a disease problem, or when actually causing disease, their presence is not discovered and the problem is therefore not recognized. For example, in a recent paper, Olson and Cook,[1] dealing with attempts to produce bovine hyperkeratosis, reported that one of the experimental animals was found at necropsy to have a marked enteritis and "a very heavy infestation with hookworms, *Bunostomum phlebotomum*. Some nodular worms, *Oesophagostomum radiatum*, were found in the cecum." The red blood cell count on this calf was 1,750,000 and the hemoglobin 3.57 gm. per 100 ml. of blood. The calf was reported to be nearly dead of anemia at the time this blood count was made. No mention was made of any antemortem diagnosis of parasitism. Numerous other instances could be cited in which heavy worm parasitism was found on postmortem examination without its presence having been discovered or even suspected before death. Worm parasites are seldom mentioned as a problem for cattle raisers other than those in the southern United States.

While research on parasites and parasitic diseases of cattle has been, as previously noted, comparatively limited, a brief review† of what has been accomplished in the last few years reveals that significant and gratifying progress is being made.

Tropical Diarrhea

Andrews and Maldonado,[2] investigating in Puerto Rico a condition called tropical diarrhea of calves, found significant infections of stomach worms (*Haemonchus contortus*), hookworms (*B. phlebotomum*), nodular worms (*O. radiatum*), small intestinal threadworms (*Cooperia punctata*), and Coccidia (*Eimeria zurnii*), in calves suffering from tropical diarrhea. In one case they attributed the diarrhea to infection with *Strongyloides papillosus*. They later[3,4,5] described the life history of the cattle nodular worm (*O. radiatum*), the pathology produced experimentally, and the clinical symptoms shown by infected animals. They demonstrated that the larvae of this worm penetrate the wall of the intestine to complete part of the life cycle, and that the most notable clinical symptom, namely, a profuse diarrhea, occurs during that phase of the life cycle of the worm.

The cause of diarrhea cannot be determined by examination of the feces of the affected animals, because the worms are still in the larval stages and have not reached the stage of egg production. Definite diagnosis can be made only by postmortem examination. A tentative diagnosis can sometimes be made by an examination of the feces of older animals with which the affected animals may be grazing. Anthelmintic treatment should be directed to the removal of the mature worms from infected animals, mainly as a means of protecting young animals. It is of no value in the treatment of the diarrhea caused by the larvae of these parasites.

It is interesting to note that this parasitic disease was well described by Jacob[6] as occurring in young cattle in Tennessee. Porter[7] published an interesting paper on the incidence of gastrointestinal parasites of cattle in the southeastern United States. In this paper, he listed the kinds and numbers of worm parasites found in 84 animals. Of these, 57 came from Alabama, four from Florida, 11 from Georgia, six from Mississippi, and six from Louisiana. He found about the same parasites as those reported by Dikmans,[8] Swanson,[9,10] and Woodhouse, Reid and Schmidt[11] in cattle in Louisiana, Georgia, Florida, and Texas, showing that they have a rather general distribution throughout the area covered by his report. He noted that his material was limited and pointed out the desirability of obtaining

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†This review is limited, with some exceptions, to work done in the member states of the Southern Veterinary Medical Association.

additional information, based on larger numbers of animals examined, for each of the states cooperating with the Regional Animal Disease Laboratory at Auburn, Ala.

The desirability of such information is obvious. Accurate information on the numbers and kinds of parasites in cattle of different ages, in specific areas, and on the ecological conditions under which they occur, constitute the basis of rational and intelligent research programs designed to deal with problems presented by parasites and the diseases for which they are responsible.

Factors Relating to Life History of Cattle Lungworms

Porter and Cauthen[13] published a paper on the life history of the cattle lungworm, *Dictyocaulus viviparus*. In experimental infections reported, the prepatent period varied from 21 to 30 days. The patent period, that is, the period during which infection is manifested by the appearance of lungworm larvae in the feces, varied from about 30 days in animals ranging from 208 to 342 days of age at the time of administration of infective larvae, to 120 days in one calf infected when only six days of age. Two of three animals were successfully reinfected after the first had been eliminated as shown by the absence of larvae from the feces. In one of these, however, the second infection was very light. In this paper, the authors also report having observed lungworm infection in a group of long yearling steers continually exposed on pasture. The majority of animals in this group were still infected with lungworms eight months later.

Porter[15] published a paper on the survival of the preparasitic stages of the cattle lungworm on pasture. He reported that these preparasitic stages did not survive on a well drained pasture for more than six weeks. The temperatures prevailing during the period of observation, that is, the period of 43 days during which the infected pasture remained unoccupied, varied from 60 to 104 F. and the rainfall was 3.1 inches. The author also noted that lungworms were readily transmitted from one calf to another when animals were crowded together in a small pasture (17 calves on a half acre), but that infection was not transmitted when animals were given greater range (an unspecified number of calves to 20 acres). Porter, Swanson and Drake[14] reported that at Gainesville, Fla., the infective larvae of *H. contortus, H. similis, Ostertagia ostertagi, Trichostrongylus axei, C. punctata, C. pectinata, O. radiatum* and *Trichuris sp.* survived on pasture from November 10, 1940 to April 1, 1941, a period of 141 days.

Porter and Cauthen[16] described experimental infection of calves with the medium stomach worm, *O. ostertagi*. They found the prepatent period to vary from 19 to 31 days and the patent period to last for, at least, seven months after the administration of a single dose of infective larvae. They gave no information on the effect on the host with these worm parasites.

Bailey[16] described the effect on calves of experimental infection with *C. punctata*, a small roundworm commonly found in the small intestine of cattle. He showed experimentally that these worms can cause serious injury when present in large numbers. Porter[7] reported finding 130,000 specimens of this worm in a naturally infected animal and Andrews (personal communication) reported finding, at necropsy, 127,000 specimens of this worm in an animal that before death had shown all the clinical symptoms ordinarily associated with heavy worm infection, namely, diarrhea, dehydration, emaciation, etc.

Vegors and Porter[17] in an abstract described the life history and pathogenicity of the intestinal nematode *S. papillosus*. Calves were more readily infected when the larvae were placed on the skin than when they were given orally. Skin penetration of the larvae caused slight local inflammation on first application, but repeated applications resulted in edema with serum exudation and scab formation at the site of application. In the intestine, the worms produced a catarrhal inflammation with petechial and ecchymotic hemorrhages, especially in the duodenum and jejunum. The clinical symptoms were intermittent diarrhea, blood and mucus in the droppings in some cases, loss of appetite, loss of condition, and retarded growth. Weight gains of heavily infected calves were from 33 to 79% less than those of uninfected controls.

Mayhew[18,19,20,21,22,23,24,25,26,27] published a series of papers dealing principally with three worm parasites of cattle, namely, stomach worms (*H. contortus*), hookworms (*B. phlebotomum*), and nodular worms (*O. radiatum*), their life histories, effects on calves, mode of infection, influence of nutritional factors, development of immunity or resistance, and the effect of the administration of small doses of phenothiazine on egg production.

Threlkeld[28] described the life history and development of the medium stomach worm of cattle, *O. ostertagi*. He found that this worm did not differ materially in its development

from other species of trichostrongylids found in cattle and sheep. The eggs hatch in 24 hours after deposition and infective larvae develop in about six days. Worms reach maturity, manifested by the appearance of eggs in the feces, in about three weeks after infective larvae have been administered. Threlkeld's investigations supplied the answers to some questions that had been left unanswered in previously published reports on the life history and development of this nematode.

Survival of Gastrointestinal Parasites on Pastures

Swanson[9] published a list of parasites found in and on domestic animals in Georgia. The parasites of cattle included in this list are the same as those reported from cattle in other parts of the southern United States. In 1942, this same author reported that, in Florida, the larvae of *H. contortus, Nematodirus filicollis, Cooperia spp.,* and *Trichuris discolor* survived a non-grazing period of 372 days. Those of *H. similis, O. ostertagi, T. axei* and *O. radiatum* survived a non-grazing period of 141 days. In 1946, he reported that, in Florida, the larvae of *H. contortus, H. similis, O. ostertagi, T. axei, Cooperia spp., O. radiatum, T. discolor, B. phlebotomum, D. viviparus* and *N. filicollis* were able to survive on carpet grass pasture for 6½ months, but not for ten to 19 months. In 1950, he published a list of worm parasites of cattle in Florida and discussed means of their control. He reported that calves naturally infected with lungworms lost their infection after 180 days of continuous confinement on concrete floors. In two experimentally infected calves, the infection lasted only 30 days and it was impossible to reinfect them.

Liver Flukes

Olsen[29,30,31,32,33] published a series of papers dealing with the cattle liver fluke, *Fasciola hepatica,* and its control. He described the bionomics of the intermediate snail host, *Stagnicola bulimoides techella,* the longevity of the metacercariae of the fluke on pastures in the upper coastal region of Texas and its relation to liver fluke control. He developed a medicinal treatment for the removal of flukes from cattle, and a schedule of treatment based on the life history of the intermediate snail host and that of the fluke in cattle.

Swanson[34,35,36] and Batte and Swanson[37] published reports on their investigation on the control of liver flukes in cattle in Florida. According to these, two species of liver flukes, *F. hepatica* and *F. gigantica,* occur in cattle in that state. Two species of snails, *Pseudosuccinea columella* and *Fossaria cubensis,* serve as intermediate hosts. Hexachlorethane was found to be an effective drug for the removal of adult flukes. The drug does not remove immature flukes and it has no effect on the viability and hatchability of fluke eggs.

Heavy infections are reported by Swanson[35]. A ten-month-old calf showing clinical evidence of severe parasitism was found to harbor 1,052 flukes. Swanson also reported that rabbits may harbor mature cattle liver flukes. The gall bladder of a rabbit harboring one fluke in the gall duct was found to contain 19,000 fluke eggs, indicating that these animals must be considered in any projected liver fluke control program.

Copper sulfate was found to be the best molluscacide. Drainage of snail infected areas is recommended, but the results of Batte and Swanson's experimental work published in 1950 indicate that the apparent absence of snails from an area ten to 15 days after it has been drained cannot be accepted as evidence that the snails have been completely eliminated. They may merely have gone underground. In their 1950 report, Batte and Swanson noted that when an area is drained snails migrate downward following the receding water line. In one experimental ditch that was drained, snails were found four inches below the surface, although the majority were found in the upper ¼ inch. The flow of water was cut off from another experimental ditch and four months later live snails were found in that ditch. The bottom of the ditch had remained moist from seepage, dew and occasional showers, but at no time had there been any standing water in the ditch for more than 24 hours.

A section of soil 2″ x 6″ x 10″ was removed from one of the experimental ditches. All visible snails were removed and the section of soil was then placed in an aquarium with enough water to keep it damp. In 17 days, 146 snails were collected from this piece of soil. Two additional sections of soil taken from this ditch were placed in aquaria and water added. A week later the water was allowed to evaporate, permitting the soil to become powdery dry. After 14 to 16 days water was again put in the aquaria containing the dry soil sections and within two hours numerous snails were found in the water. The authors conclude their report with the following gem of understatement, "These experiments indicate that snail eradication by drain-

age would be difficult", to which the present writer can only add, amen.

Coccidiosis

Coccidiosis of cattle has been investigated by Christensen[38], Boughton[39,40,41,42], and Hammond and coworkers[43,44,45]. It has been shown that cattle harbor a number of different species of Coccidia, and the life history and pathogenicity of at least one of these have been determined experimentally. While no specific medicinal treatment has been found, management procedures designed to prevent infection or lessen its degree have been developed.

Trichomoniasis

The results of the investigations carried out by members of the Zoological Division, Bureau of Animal Industry, Agricultural Research Center, Beltsville, Md., and others, on bovine venereal trichomoniasis — Rees,[46,47,48] Rees and Garlick,[49] Garlick,[50] Garlick and coworkers,[51] Hammond and Bartlett,[52,53,54,55] Bartlett,[56,57,58,59] Bartlett and coworkers,[60,61,62,63,64] are well known. These investigations have produced definite information on, (1) the cause and nature of the disease, (2) its method of spread within and among herds, (3) its characteristic clinical manifestations, (4) its pathology or effects on affected animals, (5) effective methods of handling infected herds, and (6) medicinal treatment of infected bulls.

In connection with research on bovine venereal trichomoniasis, attention must be directed to the work of the late Dr. B. B. Morgan, but an evaluation of his contributions to our knowledge of this disease does not fall within the scope of the present paper.

Anaplasmosis

The inclusion of anaplasmosis among the parasitic diseases of cattle may be questioned because the causative agent of this disease is not definitely known. It has been assumed that the rounded bodies present in a certain percentage of the red blood cells during the course of the disease are the causative agents, and there are some reasonably good grounds for that assumption. It has been assumed, furthermore, that these bodies are parasites, that is, in the sense that parasitologists, rather than bacteriologists or mycologists, interpret that term. There is no evidence supporting this latter assumption. However, inasmuch as we have generally proceeded under the assumption that the disease is parasitic, brief mention of the research work on this disease carried out in the member states of the Southern Veterinary Medical Association appears to be in order. During the last few years, it has been shown experimentally that some ticks occurring in these states can transmit the disease under certain conditions, but there is little or no evidence that these ticks act as vectors and disseminators of the disease under natural or field conditions.

It has also been shown that some tabanids and mosquitoes can act as vectors of the disease, but again the precise role of these insects as transmitters under natural or field conditions remains to be determined*. Analysis of available information on this disease (Lotze[66]) has shown that it exhibits certain definite, relatively constant, and also certain variable features. One of the relatively constant features is the period of the rise of infection, that is, the time elapsing from the first appearance of anaplasma in the red blood cells of the peripheral circulation in an experimental infection, to the time these anaplasma reach their maximum number. This period can be utilized for the testing of drugs for their curative value because the effects of drugs on the course of the disease can best be judged during that period.

Mohler and coworkers[67] described a complement fixation test for the serum diagnosis of anaplasmosis. This test is useful for the detection of carrier animals in a herd.

No specific medicinal treatment for anaplasmosis has been developed. Many drugs, including antibiotics and some of the newer antimalarials, have been tried in the treatment of this disease, thus far without success, treated animals remaining carriers after recovery, just the same as if they had recovered without treatment.

Treatment and Control

The treatment of cattle for the removal of parasites has also received its share of attention. Swanson, Porter and Connelly[68] first tested phenothiazine experimentally in the treatment of cattle for gastrointestinal parasites, and Swanson and Carlisle[69] conducted the first field trials with this drug. It has since come into common use.

This brief review indicates that in the last few years a considerable amount of work has been done on internal parasites of cattle.

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*The question of the transmission of anaplasmosis was recently reviewed (Dikmans)[65], and a detailed review of that question is therefore considered unnecessary.

There are, however, a number of problems which need, and no doubt will receive, further attention. More specific and accurate information should be obtained, on a state level, on the geographic and seasonal distribution of cattle parasites, the frequency of their occurrence and their economic importance. Such information, made readily available, would be of importance to everyone concerned with the cattle industry. Agricultural departments and experiment stations in each one of these states are constantly receiving inquiries from individuals in other parts of the country concerning the prospects of cattle raising. Some of these inquirers are genuinely and honestly ignorant of conditions affecting cattle raising in the South and want and need accurate information. Some, emotionally affected by promises of equable climate and year around grass, need to be reminded of potential diseases and parasite hazards. Still others, having read about parasites of cattle and their prevalence, a prevalence which is unfortunately only too well advertised, are afraid that their cattle "will be eaten up with parasites" and need to be assured that cattle parasites do not constitute an insuperable problem.

With accurate information on the subject of cattle parasites, these agencies will be in a position to enlighten the ignorant, caution the impetuous and overoptimistic and reassure the timid and apprehensive.

Another reason why each state should have information on the parasitic problems affecting the livestock within the state, is that the prevalence and importance of the parasites responsible for the problems depend, at least in part, on the ecological conditions obtaining within the state. Temperatures, rainfall and soil conditions differ markedly in different areas. Preventive and management practices based on results obtained from experimental work in one area under temperature and moisture conditions prevailing in that area, may have only limited application in another area with different climatic conditions.

Further information is needed on the importance of certain well known parasites. Among these are tapeworms, flukes and some roundworms. The problem of the effect on cattle, particularly calves, of tapeworm infection should be investigated. Tapeworms, like snakes, appear to have a frightening effect on some people. They are considered to be *malum in se*, that is, evil by their very nature. When found in the intestine at necropsy or when the segments are found in the feces or protruding from the anus, they are considered to be the cause of whatever ailment may be affecting the animal at the time. Perhaps tapeworms are responsible for all the trouble in calves attributed to them, but there is no experimental evidence either to prove or disprove their guilt and that evidence should be obtained.

Additional information is also needed on the effect on cattle of liver flukes. Opinions on this subject differ widely. Some persons are of the opinion that, except for the loss of the liver on slaughter, flukes cause little or no damage, whereas others believe this parasite is responsible for serious damage to the living animal; this being mainfested by loss of weight, emaciation, anemia, etc. The differences in the observed effects may be due to differences in the degree of infection or to concomitant effects of nutritional conditions, including mineral insufficiencies or imbalances, and perhaps other factors. Investigations on this problem appear to be in order. One of the main difficulties, however, that must be overcome is the raising and maintenance of a constant supply of infected snails that serve as the intermediate hosts of the flukes. This is by no means an easy matter.

The results of the experimental infection of cattle with *S. papillosus* described by Vegors and Porter (*loc.cit.*) and the report by Swanson (page 172) on the effects on cattle of this nematode indicate that it may be a more important parasite than hitherto considered. The larvae of all known species of Strongyloides infecting domestic animals are skin penetrators and the Vegors and Porter report shows that experimentally percutaneous was more successful than oral infection. There is, at present, no medicinal treatment for cattle infected with these worms and it therefore becomes important to determine the conditions under which natural infections are acquired, and to devise preventive measures.

Comparatively few sheep are raised in some of the member states of the S.V.M.A. but in others, both the cattle and sheep industries are important. In the latter states, the problem of the possible interchange of parasites between cattle and sheep, either when they are grazed together on the same pasture or when they follow each other on pasture, should receive some attention. Some interchange of these parasites has been noted by Clunies Ross,[70] Stoll,[71] Taylor[73] and Roberts,[78] but Woodhouse and coworkers[74] reported that their attempts to infect parasite

free lambs with infective nematode larvae of bovine origin were unsuccessful.

There are problems of medicinal or drug treatment of cattle for parasites that should be investigated. There is a decided need for an effective medicinal treatment for lungworm infestation, none being now available. As previously noted, Strongyloides infection is not affected by any of the anthelmintic drugs now commonly used in the treatment of cattle for the removal of other worm parasites. Phenothiazine is generally considered to be more effective against different parasites than any other anthelmintic, but it is not without its disadvantages. Administering phenothiazine in the required quantities to a sizable herd of fractious animals that have not been gentled by constant handling, is a task only little short of Herculean. It requires strong men and adequate equipment.

In the final analysis, however, medicinal treatment, regardless of its necessity and its effectiveness, is of secondary importance, because a great deal of injury usually has been produced and considerable damage caused before treatment is instituted. Ordinarily, when the veterinarian is called upon to take care of cases of parasitism in cattle he finds that the condition has been present for some time. He not uncommonly finds that some animals have died and that others are in very poor physical condition. Medicinal treatment is then indicated and it is then definitely advantageous to have effective treatment available, but it is better to be able to prevent the development of situations that make such treatment necessary. This ability results from a thorough knowledge of all the factors that enter into the problem of cattle parasitism in any given locality, and that knowledge can be obtained only by persistent and painstaking research.

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(Reference list concluded on page XXX)

The Veterinarian's Responsibility

(*Continued from page 190*)

good public health work than many allied professions accomplish with specific effort. The control of transmissible animal diseases is routine for the average practitioner. Vaccination of dogs for rabies, testing of cattle for tuberculosis and brucellosis, vaccination of horses for equine encephalomyelitis, and many other routine duties fall in the category of public health, but the treatment of these diseases alone, without unified effort in their control, is not enough. There should be adequate reporting of infectious and contagious diseases to the control agency so that unified attack and control may be undertaken. The ideal of human or veterinary medicine is prevention of disease. Comprehensive efforts to protect the public, who suffer economically and often physically through the diseases of animals they raise or with which they come in contact, has not as yet been made, and there will not be any change until the practitioner assumes the responsibility for prevention as well as treatment.

The veterinarian, even though he devotes his entire time to practice, is still engaging in public health service in the protection of his community. He should know and understand the function of his local health agency and do his part and offer assistance, advice and consultation. This is a civic duty which he owes his state and his community.

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Cosmetic Ear Surgery

(*Continued from page 194*)

to remain in place, in such a manner to allow direct air contact.

Very little home treatment is required. Patients are discharged the day following surgery. They are checked and redressed on alternate days and the sutures removed on the seventh day. Select ears are erect as early as the third or fourth postoperative day and heal uneventfully. Certain other ears are more of a challenge and require additional supportive measures. Massage with a bland ointment is recommended following tape and suture removal.

Summary

A method of ear trimming with certain reference to postoperative support has been presented wherein an attempt has been made to indicate several advantages, namely:

1. Straight method of marking to facilitate a rapid symmetrical trimming line.

2. Use of stainless steel sutures assures good tissue tolerance with some measure of support.

3. Suggestion for better hemostasis through injection of epinephrine.

4. Use of gauze roll with adhesive backing provides a comfortable protective support and assures good tissue approximation with equalized pressure. These requisites of cosmetic or plastic surgery are well adapted to rapid primary healing with minimum care.

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Mammary Vein Bleeding*

JOHN C. FOWBLE, D.V.M., Timonium, Maryland

In 1946, a client remodeled a horse barn for a test-cow barn. It was built so that there was no easy way to get in front of the cattle as the feed was brought in at the side of each cow. Therefore, it was easier to bleed these cattle by the mammary vein, using the tail up over the back as a means of restraint. Since this experience, the writer has preferred this method for bleeding all breeds of dairy cattle, including Milking Shorthorns, in all kinds of stanchions and loafing parlors.

Herds are classified in three groups; the large herds with three or more men caring for them, the farmer herd where the farmer and his family take care of the cattle, and the small herd that has one herdsman and no other regular help. Animals in the first two groups usually do not become tense when a stranger enters the barn. In the third group, there are problem cows that are nervous. These cows should be bled by the neck method and turned loose from the herd. The balance may then be bled by the mammary vein. The herdsman will know the nervous cattle. They should be handled carefully and judgment exercised as to preferable bleeding method. First-calf cows may be bled by using the milk well if the mammary vein is not well developed.

One herdsman restrains cattle by placing his right leg in front of the cow's right hind leg and holding the tail up at the same time. The writer believes this is the best method.

A 14 gauge, 3 in. bleeding needle in a rubber stoppered tube is used; bleeding from the right milk vein. It is not necessary to exert pressure on the vein. This is a faster, easier way of bleeding, and restraint is simplified. Thirty stanchioned cows can be bled in five minutes.

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*Presented (with motion pictures) at the 34th annual meeting of the Southern Veterinary Medical Association, Baltimore, Md., Oct. 22-24, 1951.

EDITORIAL COMMENTS

Foot-and-Mouth Disease Report

Eradication of foot-and-mouth disease in Mexico is in sight, according to announcement by the Secretary of Agriculture. If present favorable conditions continue and no more outbreaks occur by September 1, 1952, Mexico will be declared free of the disease for the first time since the outbreak in 1946. Thus the barrier to many thousands of cattle in the northern provinces will be lowered to allow entrance into the United States. Supplies of slaughter, feeder, and stocker classes have been built up so that large numbers may be expected to enter commercial channels immediately after quarantine restrictions are lifted.

No New Outbreaks in Canada

Canada has restricted the movements of immigrants from foot-and-mouth disease areas of Europe. The farmhand from West Germany employed on a Saskatchewan farm, who was under critical survey as a possible carrier, has been completely cleared. No substitute theory of the origin of the outbreak has been offered by Canadian officials.

Recently, several specially trained veterinarians from the Bureau of Animal Industry force have been assigned in Canada to collaborate in the eradication work. Also, all shipments immediately prior to quarantine of livestock and meat products that might possibly be contaminated with infective virus have been traced to consignment points and are held under observation and frequent inspection. Quarantine regulations and inspection procedures have been strengthened along the international border. Dr. T. Childs, veterinary director-general of the Dominion Department of Agriculture, has stated that "every day that passes makes it less likely that there will be further outbreaks."

All state and county mobilization committees have been requested to cooperate with sanitary officials, and to assist by alerting stockmen to report any suspicious disease symptoms promptly. Wide circulation has been given to explanatory information about the disease in the farm press and in daily newspapers.

Assurance can be taken from the fact that Canadian veterinarians and officials are well organized to prevent spread of infection. How freezing weather conditions may have preserved the virus remains to be determined after a general spring thaw.

Inherent Danger in Lay Prescription for Animal Diseases

A young man must spend six years of vigorous, concentrated study, four of which must be in one of 19 schools of veterinary medicine in the United States and Canada, in order to qualify to practice animal medicine and to prescribe for livestock ills. After graduation, he must accreditably pass an examination before a state board of examiners who issue a certificate of qualification or license to practice. Experience and pursuit of advanced training, and the devotion of additional years of effort are necessary to qualify as an authority, usually in a specialized field.

Prescribing for animal ills by unqualified persons endangers the health of the livestock industry and, at the same time, jeopardizes the health of those who consume animal products. No intelligent, conscientious person would consider turning back to the medical faker of generations ago for advice on the treatment of human ill health, yet the equally untrained are encouraged by some to prescribe and dispense much more powerful and specific drugs for animal diseases. These have margins of safety well calculated, yet are dangerous when used promiscuously.

Livestock interests have encouraged raising the standard of professional qualifications to deal with modern day, and many times complex, animal diseases. Any treatment is worthless without a proper diagnosis. Threat of animal plagues and disastrous financial losses hover over American livestock today. A strong and healthy meat industry and a well nourished population, supplied adequate animal proteins, keep our nation strong. The veterinarian is the keystone of this well analyzed concept. Service rendered by him has been and will continue to build confidence of livestock growers in professional qualifications of veterinary practitioners.

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Dog breeders and their advisers should recall that normally bitches hemorrhage from the uterus at the beginning of estrum, though ovulation does not occur until ten to 12 days later. If bred before ovulation (fortunately the female does not willingly accept the male before that time), the litter will be small, or there may be no conception at all. In this latter event, good females are sometimes condemned as being sterile.

Brucellosis Eradication

It is considered by some authorities that brucellosis is the most serious threat that affects livestock in the United States. Livestock interests and the general public have shown an awakened interest in this disease, which has been reflected in the activities of the campaign to eradicate brucellosis. Since 1946, infection rate has dropped steadily from 5% to 3.1%.

During the past year, 5,640,836 blood agglutination tests were completed on cattle from 565,155 herds, disclosing 172,322 reactors. Of these, 65% were removed for immediate slaughter and the remaining 35% were held for later disposition under the deferred slaughter and vaccination plan. Since reactor elimination is optional in most states, removal for immediate slaughter of this large number indicates the understanding on the part of livestock owners of the danger to both the animals in affected herds and to human beings who come in personal contact with animals or, in the case of dairy cows, that supply fluid milk. Of the herds tested this year, 87% were brucellosis-free, as compared with the figure of 84% for the previous year. There was a corresponding drop in the average number of reactors per herd.—*Annual Rept., Chief, BAI, 1951.*

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Swine Brucellosis in Illinois

Recapitulation of results of blood testing for brucellosis in swine in Illinois for 1951 shows 1,859 reactors (8%) of 27,787 animals tested. This is a significant reduction in incidence from that reported for 1950. Interesting is the fact that 27.8% of reactors were boars.

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Scabies in sheep has engaged the attention of regulatory officials in several midwestern and western states. Some states now require the dipping of all sheep consigned to points within their boundaries. No further outbreaks have occurred in Colorado and it is anticipated that the state quarantine will be removed by July.

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Nearly 2,000,000 casualties, the worst accident toll in the nation's history, were recorded in 1951, according to figures released by The Travelers Insurance Companies; of these, 37,100 died.

Foreign Bodies in the Stomach

For foreign bodies, such as small rubber or plastic balls or toys, stones, bones or other objects that can be determined by *x*-ray or palpation in the stomach, induced emesis is the first thought for treatment.

Before injecting a therapeutic dose of apomorphine, from ⅛ to 1 oz. of vegetable mucilloid such as metamucil® is given in gelatin capsules. Approximately 30 minutes are allowed for the capsule to dissolve and coat the foreign body. The metamucil is a nonirritating material, mucilaginous in character, that is useful as a lubricant. Foreign bodies are vomited as large sticky masses.—*Harlan E. Jensen, D.V.M.*

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National Scientific Register to Begin Survey of Veterinarians

Growing importance of veterinary medicine in the nation's economy is highlighted in an announcement that United States veterinarians will soon be catalogued in the National Scientific Register.

The American Veterinary Medical Association announced on March 1 that the National Security Resources Board and the U. S. Office of Education, which already have assembled data on 150,000 individuals in some of the country's top-ranking scientific fields, will carry on a classification survey of all United States veterinarians this spring and summer in cooperation with the A.V.M.A.

Purpose of the survey is to build a sound base for long-range planning of research and technical development in order to meet expanding needs and to pave the way for immediately effective utilization of scientific manpower in event of another global war.

In announcing the project, Dr. C. D. Van Houweling, A.V.M.A. assistant executive secretary, emphasized that it will be to the advantage of every veterinarian to cooperate in the survey, and he urged that prompt attention be given to filling out and returning the questionnaires. Non-members as well as members will be included. It is expected that all veterinarians will have received the questionnaire by mid-summer.

Information obtained will be coded and recorded on machine-record cards. The electronic recording method to be used is described as the most efficient system of personnel registration yet developed.

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Unusual Outbreaks of Anthrax

Members of the U. S. Livestock Sanitary Association recently met with officials of the USDA and the U. S. Public Health Administration to discuss means for combating unusual outbreaks of anthrax in parts of the country which have been free of the disease for years.

During the past year, and especially during recent weeks, outbreaks of anthrax have been reported, particularly in swine herds. These have occurred where the disease is not normally a problem. Ordinarily, anthrax is a greater threat to cattle, occurring during summer months. Unusual aspects of recent infection are therefore apparent.

Officials from at least three states claimed transmission through feed containing insufficiently sterilized bone meal originating in Europe. Cases of anthrax in pigs have been traced to the ingestion of such material. Present regulations governing the importation of ground bone meal are unrestricted or require only that it be subjected to heat of not less than 156 F. (Code of Federal Regulations, 1949. Part 95, Chap. 1, par. 95.12 to 95.15 inc.) Such temperature will not destroy anthrax spores.

Resolutions arising from discussions requested the Secretary of Agriculture to formulate and carry out regulations to prevent the importation of bone meal except when properly sterilized. They also requested that manufacturers be required to label all feed containing bone meal to the effect that proper sterilization has been done. Plans also were made to report outbreaks to the BAI.

Although it is generally considered that herbivorous animals usually become infected as the result of ingestion of food or water contaminated with the organism or spores, it is not always possible to infect animals experimentally by administering spores by mouth. Spores may pass in the feces, retaining viability without causing apparent illness in the animal passing such infective material. Insects and birds (see VETERINARY MEDICINE, March 1952, p. 118) may be mechanical carriers or actually disseminate the disease by passing spores in the feces. Hides from animals dead of anthrax are regarded as permanently infected.

Anthrax has occurred in the United States for at least 65 years. Certain areas of the country have become more or less permanently infected as the spores causing the disease get into the soil and there are no known means of ridding a premise once the spores become established. In some limited areas, annual vaccination has been practiced for years.

Current outbreaks have not followed the pattern of occurrences and have not been expected. The need is pressing for establishing the source of infection in all outbreaks.

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Reuniting Mercury Column of Thermometers

First, tap the case or thermometer in the palm of your hand, bulb down. If this does not work, tie a stout string to the thermometer if it has a loop at the end opposite the bulb, and swing it in a circle. Finally, the refrigeration technic may serve by drawing the mercury down into the bulb. Place bulb-down in the freezing compartment for a short period.—*S.N.L., Feb. 16, 1952.*

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Infectious Canine Hepatitis

(*Continued from page 192*)

8. In puppies, the thymus is very hemorrhagic. This is considered to be an important diagnostic feature.

Inclusion Bodies

To really establish the diagnosis, reliance must be placed on the demonstration of typical intranuclear inclusion bodies, especially in the liver and brain. Sterile liver or brain may be ground in a sterile diluent and 0.25 cc. injected into the anterior chamber of a dog's eye. The cornea will turn white in three to five days. If the eye is then removed and a smear made from scrapings of the endothelial surface, typical inclusions will be found. One caution here is to use only sterile material, since bacteria will also cause cloudiness of the eye. However, if it is caused by bacteria, there will be pus in the anterior chamber; when caused by virus, the fluid will be clear.

In conclusion, it is desired to point out that hepatitis virus has been isolated from the urine of recovered dogs for more than 200 days after recovery. This means that carriers may be in our midst at any time. How then are veterinarians going to protect other dogs under their care from becoming infected? The only suggestion that can be offered is the routine use of serum containing hepatitis antibodies on all young animals brought into the hospital. This will protect them while they build up an immunity in the event of exposure.

Gas Phlegmon: A Report of Two Cases

G. C. POPPENHOUSE, D.V.M., Milledgeville, Ill.

On February 18, 1951, a Holstein heifer calf, ten months of age, was observed to have an extensive edematous swelling extending from the mandibular space, ventrally down the neck, through the right and left axillary spaces, to the umbilicus. Temperature recorded was 104.5 F., the appetite fair, but the heifer was unable to lower her head to reach feed and water. The owner stated that the swelling had started several days before, but did not at that time interfere with the ability of the animal to eat or drink. Prognosis was guarded.

Treatment. An elevated platform, 2 ft. high, was arranged to hold feed and water. A solution of 12½% sodium sulfamethazine, and 12½% sodium sulfathiazole was injected intraperitoneally at the rate of 1 gr. per lb. body weight. This dose was repeated in 24 hours. The third day an injection of sulfamethazine was given. At this time, the temperature had dropped to 101.5 F., and the appetite had improved. Skin covering both axillary spaces had turned a dark purple, extending from the anterior point of the brisket posteriorly for approximately 12 in. A dark colored fluid was noted to drip from the surface of the involved area. On the fourth day, warm epsom salt packs were applied and held in place with a wide canvas belt. This treatment was continued twice a day for one week. On the tenth day, an area 12 in. long by 4 in. wide sloughed from the left and right axillary spaces. The edema of the neck had almost disappeared. The appetite remained good, and the heifer thereafter made a slow but uneventful recovery.

This heifer was observed four months later. Two scars about the size of a silver dollar were noted in the axillary spaces, with a loop of loose skin the size of ⅝ in. rope, attached from the point of the brisket to the middle third of the neck. The skin under the loop had closed, and the hand could be passed between the loop of skin and the neck. This heifer is due to calf.

Case 2. On June 5, 1951, a call was made to treat a lame cow unable to walk in from the pasture. This was a three-year-old Holstein cow, fresh about four months. Temperature was 105 F. The left front leg was swollen and edematous from above the knee to the withers. Palpating the area produced crepitation and pain. Swelling was greatest in the left axillary space, causing the left foreleg to be pushed out from the body. No scratches, cuts, nor puncture wounds could be found in the affected area. The owner stated that the cow had eaten her feed, and had gone to the pasture that morning. She had shown some lameness, with a drop in milk the previous day, but since her appetite was good, the owner felt that nothing needed to be done unless she became worse.

Case 2. Area of slough indicated by broken line.

This cow received 3,000,000 units of penicillin in oil at 24-hour intervals for three days. The first day she would stand in one spot and could not be made to move. After 72 hours, the appetite had improved, and the animal moved about in the pasture by putting some weight on the affected leg. Her temperature had dropped to 101.5 F. At this time, a straw colored serum was dripping from several points in the swollen axillary space. The penicillin injections were continued at 48-hour intervals for four more treatments. On June 16, a large area started to slough. This extended from the anterior point of the brisket posteriorly to about the tenth rib, from the sternum dorsally to a point about 6 in. above the elbow on the left side of the chest. The ribs and sternum were visibly exposed, as was also the brachial plexus. The appetite continued to improve and the cow moved about in the pasture to graze. The open wound was flushed daily with potassium permanganate solution and then sprayed to repel flies and kill screwworms.

After four months, the area was covered except a spot 6 x 10 in. in the left axillary space. This spot is being treated as an open

wound, and the area is gradually filling in with healthy tissue. The cow lost about 500 lb. in weight during the period, but has recovered most of it. The accompanying illustration indicates the approximate area of the initial slough indicated by broken white line.

This case was of especial interest because of the fact that the animal recovered after suffering extensive sloughing of tissue.

Tentative diagnosis of malignant edema was made on both animals; neither of which were expected to survive when treatment was initiated. They occurred on widely separated farms. No laboratory confirmation of diagnosis was made.

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Report on the Use of Nitrogen Mustard in Two Cases of Neoplastic Blood Disease

C. H. CLARK†, D.V.M., M.Sc., Columbus, Ohio

Numerous reports in the literature have indicated that some of the nitrogen mustards such as mechlorethamine hydrochloride (Merck) have a beneficial effect in the treatment of certain types of leukemia. It has been felt by most investigators, however, that the use of nitrogen mustards is not a permanent cure, but only a temporary relief of the symptoms. With this in mind, the treatment of two Scottish Terriers with blood neoplasia was attempted.

The first animal was presented to the Clinic,* July 12, 1951. The dog was in very poor condition, exhibiting symptoms of anorexia, dehydration, and marked distention of the abdomen. Part of this distention was due to a sanguineous fluid, but most of it was due to a tremendously enlarged spleen. Hemogram indicated a leukocytosis of 52,350 cells per cmm. Of these cells, 59% were lymphocytes. A clinical diagnosis of splenic tumor was made from this evidence. It was eight days before mechlorethamine hydrochloride was obtainable for treatment. By this time the lymphocytes had risen to 77%. The drug was given in four injections of 0.5, 0.5, 0.8, and 1 mg. at weekly intervals. Twenty-four hours after the first injection, the leukocyte count dropped to 29,800. It had been 45,100 the preceding day. Four weeks later, or at the end of the treatment, the white cell count had dropped from 45,100 to 17,650. The lymphocytes dropped from 77% to 32% in the same interval. The patient had gained 2 lb. and appeared to be in excellent health.

In January 1952, the dog was returned in very poor health. Further treatment with mechorethamine hydrochloride failed to relieve the symptoms. Death occurred January 24, 1952. It was felt that the dog's life had been prolonged about six months.

The second animal was in very good condition when first seen. The owners presented the dog only because of the very large lymph glands. Total leukocyte count and the differential count were in the normal range. A clinical diagnosis of aleukemic leukemia was made on this evidence.

The patient was treated with four injections of 1 mg. of mechlorethamine hydrochloride on four successive days. The owner was advised to return the animal in one month for further treatment. At that time lymph glands were much larger and the dog was so weak it could not stand. Euthanasia was performed. Apparently mechlorethamine hydrochloride had very little, if any, effect on this particular case.

Discussion

Mechlorethamine hydrochloride temporarily relieved the symptoms in one case of splenic sarcoma, and failed in a case of aleukemic leukemia. In patients with splenic tumor, this drug might be of value in relieving

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*The Glendale Small Animal Hospital, Glendale, Calif.

Blood Changes Noted in the Scottish Terrier with a Splenic Tumor During the Treatment of the Disease.

Date	Total RBC	Total WBC	Per cent of				
			Neutrophils	Lymphocytes	Eosinophils	Basophils	Monocytes
7/12	4,010,000	52,000	38	59	0	0	3
7/20*	3,160,000	45,100	21	75	1	0	3
7/27*	4,200,000	22,000	53	40	0	3	4
8/3*	4,580,000	16,600	50	43	1	0	6
8/10*	4,700,000	16,150	61	32	2	0	5

*Injections of nitrogen mustard were given on July 20, 27, August 3, and 10.

symptoms of the disease; so that the patient may be a better risk for splenectomy. In the case reported, the owner did not wish surgery, but it was obvious that the dog would have had a much better chance of surviving the operation after treatment with mechlorethamine hydrochloride than before.

Summary

1. Mechlorethamine hydrochloride failed to show any curative effects on one case of aleukemic leukemia.

2. Mechlorethamine hydrochloride relieved the disease symptoms for six months in one case of splenic tumor. Repeat treatment after return of symptoms failed.

Acknowledgment

The writer would like to express his deepest thanks to Dr. D. A. Adler and Dr. O. E. Mullins for their help in preparing this paper.

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Use of Estradiol Cyclopentylate (ECP) in Slow or Nonbreeding Chinchillas

PAUL M. NEWBERNE, D.V.M., M.S.,
Columbus, Georgia

The chinchilla industry is now directing its efforts toward expanding population for commercial pelting. Scarcity of good breeding stock and high values placed on it makes a good breeding program and continued reproduction, matters of prime importance to the chinchilla rancher.

Due to the size of the animal, diagnostic procedures used in detecting etiological factors in dairy cattle and other animals are not applicable to the chinchilla. It is not possible to diagnose functional sterility in this species due to absent or delayed ovulation or to factors involved in seating the fertilized ovum in the uterus. Retained corpora lutea and cystic ovaries have been observed at autopsy on many females with poor breeding histories. These factors are to be considered along with nonfunctioning ovaries and low grade infections in animals that have histories of no breedings or long periods elapsing since littering.

Several cases of low grade vaginitis or metritis, or both, have been observed in recent months, determined by examination with the aid of an otoscope used as a vaginal speculum. Good results have been obtained in these cases by instilling penicillin and streptomycin directly into the uterus and vagina. Parenteral administration of antibiotics has also been followed by good results. Discharges have ranged from serous to mucopurulent, but have cleared in most instances following treatment.

Few accounts appear in veterinary literature on the use of estrogenic substances in chinchillas and in these, the number of animals has been so small as to make valid conclusions impossible.

Females used in this experiment were animals over one year of age that had not bred and those with a year or more elapsed time since last littering. The drug used was estradiol cyclopentylate (ECP)®. Only one injection was given. In all cases where estrum occurred, it was from four to ten days following injection. Results obtained are listed in table form.

Dosage	No. Animals Injected	Estrum Produced	No. Animals Littering	% Cases Littering
0.1 mg.	22	14	8	36.3
0.2 mg.	28	21	15	53.5
0.3 mg.	16	15	5	31.2

Summary

1. Slow breeding and nonbreeding is of growing concern to the chinchilla industry and indirectly to veterinarians.

2. Much of the trouble may be attributed to failure of estrum, due in part to nonfunctioning and cystic ovaries or retained corpus luteum.

3. Estradiol cyclopentylate (ECP) induced estrum in 50 of 66 chinchillas with conception and littering in 28.

4. There were 12 conceptions on heat cycle induced by ECP; 16 conceptions occurred in period following estrum produced by treatment.

5. Two-tenths mg. appears to be the best dosage for the chinchilla; 0.1 mg. did not appear to produce maximum estrum and 0.3 mg. caused the animals to remain in estrum an excessive length of time.

Conclusions

Estradiol cyclopentylate (ECP) appears to be of value for inducing estrum in chinchillas.

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Slow intravenous injection of the equivalent of ¾ units of curare per pound of body weight to dogs under a light plane pentobarbital anesthesia increases the apparent depth of anesthesia and effects marked relaxation of muscle tissue.—*Deets Pickett, D.V.M.*

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BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 15, Missouri.

SHEEP DISEASES, by *I. E. Newsom,* D.V.S., D.Sc., former dean of the Division of Veterinary Medicine and president emeritus of Colorado A. and M. College, Fort Collins. 352 pages, 118 illustrations. The Williams & Wilkins Co., Baltimore, Md., publishers, 1952.—Price $7.00.

The fact that Doctor Newsom was permitted to devote full time for over a year to the preparation of this book on sheep diseases does not mean that it represents investigations into the subject for so short a period. It may be said with more accuracy that its appearance is the culmination of many years of research and investigation in ovine diseases at the Colorado Experiment Station.

A literary vacuum on sheep diseases has existed that this textbook will fill. Most of the few books published on the subject are both outdated and out of print. This book will find waiting hands because of the new interest and increase in numbers of farm flocks.

Text material is divided into four parts: Part I, Infectious Diseases; Part II, Parasitic Diseases; Part III, Non-Infectious Diseases; Part IV, Poisons. Subject matter is outlined to give brief introduction and definitions, history, etiology, symptoms, lesions, diagnosis, control, and treatment. It should serve admirably as a text for veterinary students and also should be of value to practitioners.

Information given is authoritative. It not only covers the author's personal experiences, but constitutes a resume of the world's literature on the subject. Especially commendable are the comprehensive reference lists that follow each subject. Particularly recommended for study is the section on parasitic diseases and poisons—alone worth the cost of the text.

One may criticize the brevity in discussions of some important affections; little over a page to brucellosis, less than three pages (other than illustrations) to pregnancy disease. However, for those who wish further reading on any given subject, the reader is supplied with selected references (10 for brucellosis; 18 for pregnancy disease).

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Cellulose sponges are satisfactory for cleaning cages, walls, and floors. They are less expensive than natural sponges and wear better.—*R. E. Ruggles, D.V.M.*

LIVESTOCK HEALTH ENCYCLOPEDIA, by *Rudolph Seiden.* 614 pages, 300 illustrations. Springer Publishing Company, Inc., New York, N. Y., publishers, 1951.—Price $7.50.

The text material consists of concise statements which embody much of what is commonly known about sanitation, drugs, disinfectants, insecticides, feeds and feed supplements, animal diseases and parasites, and other related subjects, alphabetically arranged; thus the title for the book.

As prepared, it is suited primarily as a reference guide. Terse treatment of many subjects eliminates exhaustive discussion, and it is not intended as a scientific textbook for veterinarians. The author, who has designated himself as editor, has included useful substance derived from 285 official books, bulletins and other publications, a list of which is appended, as is a list of authors of official publications. A wealth of information is dependable and up-to-date and is written understandably. It will serve its primary useful purpose for growers as a specialized dictionary of terms.

It is not a text designed, as some have been, to make every livestock owner his own veterinarian; rather it is based on the premise that a well informed client is usually an understanding one. It also points up the multiple ramifications of disease processes, emphasizing the essential need for qualified persons for accurate diagnosis and recommendations in handling specific problems. Readers are advised that disease problems must be referred to the attending veterinarian.

Presentation, capitalization, italicization, abbreviation, and other mechanics of presentation disregard precedent established for scientific works.

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Turkey Diseases. Cardboard bound bulletin, well illustrated and indexed, prepared for turkey raisers. Brief factual information is given on all phases of control, diagnosis, prevention and treatment. Dr. W. R. Hinshaw and Dr. A. S. Rosenwald, co-authors. Edited by Mary Rubo. Published by the College of Agriculture, University of California, Berkeley. Manual 3, Price $1.00.